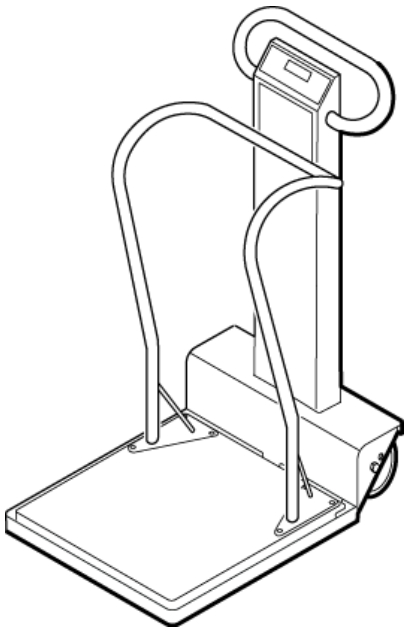
Welch Allyn Masted Scales



Service Manual

Model 5002	Mobile Stand-On Scale
Model 5122	Stand-On Scale
Model 5702	Mobile Bariatric Scale
Model 6002	Wheelchair Scales
Model 6702/SP/W	Mobile Bariatric Scale

Welch Allyn®

Advancing Frontline Care™

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Scale setup

You can customize the scale to best suit your needs. Configurations that can be selected include the automatic shut-off time, weighing units, weight resolution, and more.

Enter custom setup mode

1. Make sure the scale is powered down.
2. Press and hold **ST** while pressing **ON**.
3. Once the scale powers up, press and release **ST** five times. The scale displays **SEt-UP** and produces a series of four long beeps.
4. The "RE CALL" pushbutton is used to select the particular option value.
5. Once this value is selected the scale can be advanced to the next option by again pressing the **"ST"** pushbutton or it can be shut-off by pressing and holding the "**ON**" pushbutton.

Set the options

Enter the custom setup as described.

1. Press **ST** to scroll through the custom setup options.

Note Options indicated with an asterisk (*) have multiple selections.

2. Press **RE CALL** once a value is displayed to change the value. When the desired value appears, press **ST** to set the new value.
3. You can exit the menu at any time by pressing **ON** to power down the scale. The scale saves all changes. The options displayed with each press are as follows:

Option displayed Feature

SOFt This option displays the software version of your scale.

dAtE This option displays the release date of the software. The format is MM/DD/YY.

SCALE This option displays the model number of the scale.

AutOFF* This displays the number of seconds before the scale turns off. The **Cont** value prevents the scale from turning off automatically.

AC con* This option causes the scale to remain on when plugged in to AC power.

rES* This option allows you to change the resolution of weight. Pressing **ST** switches between the

following options:

LBS	Kg
0.1	0.05
0.1	0.1
0.2	0.1
0.5	0.2
1.0	0.5

UnitS* This option allows you to change the displayed weight unit. Press ***RECALL*** to choose between the following options:
Note Do not change the scale units if you have purchased the kilogram-only option.

KILOS* This option allows the weight to display in kilograms.

POUNDS* This option allows the weight to display in pounds.

bEEPEr* This option determines the audible signal that occurs when a front panel button is pressed.

rECALL* This option allows you to turn **ON** or **OFF** the **RECALL** button functionality.

rS-232 Detailed instructions for this feature are available from Welch Allyn. Go to http://www.welchallyn.com/en/other/contact-us.html to find your local representative.

OutPut* This option displays the current data port output option. Detailed instructions for this feature are available from Welch Allyn. Go to http://www.welchallyn.com/en/other/contact-us.html to find your local representative.

Set the value to **OFF** to disable the optional internal printer or the RS-232 port.

PrtUnt* This option determines whether pounds or kilograms are displayed on a printout.

If the pounds and kilograms indicators are illuminated on the control panel, the printed output is determined by whichever unit is selected on the control panel.

If the kilogram indicator is illuminated, it will only print in kilograms, regardless of the unit is selected on the control panel.

If the pounds' indicator is illuminated, it will only print in pounds, regardless of the unit is selected on the control panel.

PrtOPT* Press ***RECALL*** to choose between the following options:

PnlPrt: The current weight is printed when ***PRINT*** is pressed on the control panel.

AutPrt: The current weight is automatically printed when a weight reading occurs.

bAud* This option allows you to set the baud rate. Values are 1200, 2400, 4800, 9600, and 19200.

pArity* This option allows you to change the parity between the following options:

Off: No parity, 8 data bits
Odd: Odd parity, 7 data bits
EuEn: Even parity, 7 data bits

StPbit* This option allows you to change the stop bits between the following options:

1 bit: One stop at the end of a word
2 bits: Two stops at the end of a word

rts.cts* This option allows you to turn **On** or **Off** the handshaking hardware for serial transmissions.

Prtbtn* This option allows you to turn **On** or **Off** the front panel ***PRINT*** button.

rtEPrt* This option allows you to turn **On** or **Off** the enabling of printing from a remote location by connecting the receive line to the ground.

PC brd This option displays the model number of the printed circuit board. A second press of **ST** displays the revision of the printed circuit board.

SEt-UP This option is displayed when you have cycled through all the options. Press and hold **ON** to power down the scale.

Enter Advanced Service Mode

1. To enter the "service" mode start with the scale turned off.
2. Note the small "ST" logo (***"ST"***) located directly above the "**RE CALL**" pushbutton, and below the "**Zero"** pushbutton on the front panel of the readout.
3. This "***ST***" contains a small hidden pushbutton.
4. Next; press and hold this "***Zero***" pushbutton on the front panel while turning the power on with the "**ON**" pushbutton.
5. As soon as the scale turns on release the "***Zero***" pushbutton, then quickly press and release ***"ST"*** logo pushbutton 5 times.
6. The scale will display "***Srvice***" and produce a series of four long beeps.
7. Service mode has now been entered.
8. Pressing the "***ST***" pushbutton will advance the display to the next item.
9. The scale will exit the service mode automatically after 3 minutes, or shut-off by pressing and holding the "**ON**" pushbutton for 3 or 4 seconds.
10. When the scale is turned back on, normal scale operation will resume.

Menu List for Advanced Service Mode

1. ***"A-d"***, and next window on display will show the raw A/D reading. As you press on the Platform the A/D reading will chance. The weight chance reading should be positive proportionally with the applied weight in pounds.
2. ***"tESt"***, and the next window will start displaying the display test, Number will show across from 0 to 9 and repeat w/ DP, from right side to left side.
3. ***"Pr-OnS"*** = Power on start-up, next display will show the number of times the "ON" pushbutton has been depressed.

4. ***"Pr-rcl"*** = Powered by Recall, next display will show the number of times the "RECALL" pushbutton has powered-up the scale (from an off state).
5. ***"COUntS"*** = Weighing Counts, next display will show the number of times a weight reading has been achieved.
6. ***"rEcntS"*** = Reweigh counts, next display will show the number of times "Reweigh" pushbutton has been depressed.
7. ***"rECLLS"*** = recalls, next display will show the number of times the "RECALL" pushbutton has been depressed.
8. ***"OFFS"*** = Turned Off, next display will show the number of times the scale has been turned off by holding the "ON" pushbutton down.
9. ***"PrintS"*** = Prints, next display will show the number of times the "Print" pushbutton has been depressed.
10. ***"SEtUPS"*** = set-up mode, next display will show the number of times the unit has entered into the set-up mode.
11. ***"SEruES"*** = service mode, next display will show the number of times the unit has entered into the service mode.
12. ***"CALS"*** = Cal mode, next display will show the number of times the unit has entered into the Cal mode.

Support services

If you have a problem with the device that you cannot resolve, call the Welch Allyn Technical Support Center nearest you for assistance. A representative will assist you in troubleshooting the problem and will make every effort to solve the problem over the phone, potentially avoiding an unnecessary return.
Technical support is available 9am-5pm EST.

Welch Allyn offers the following technical support services:

- Telephone support
- Replacement service parts
- Product service

For information on any of these services, go to www.welchallyn.com/en/servicesupport.html.

Warranty

Welch Allyn will warranty the weight scale to be free of defects in material and workmanship and to perform in accordance with manufacturer specifications for the period of one year from the date of retail purchase.

The warranty period shall start on the date of purchase. The date of purchase is:

- the invoiced ship date if the device was purchased directly from Welch Allyn
- the date specified during product registration
- the date of purchase of the product from a Welch Allyn authorized distributor as documented from a receipt from said distributor.

This warranty does NOT cover damages caused by misuse or abuse, including but not limited to:

- Failure caused by unauthorized repairs or modifications
- Damage caused by shock or dropping during transportation
- Damage caused by improper use of the power supply
- Failure caused by improper operation not consistent with the instructions stated in this *Directions for use*

Should this device require maintenance (or replacement at our option) under warranty, contact your local Welch Allyn representative: http://www.welchallyn.com/en/other/contact-us.html

Repairs

A Welch Allyn Service Center or Authorized Service Provider must perform all repairs on products under warranty unless you are a properly trained technician.

CAUTION Unauthorized repairs will void the product warranty.

Qualified service personnel or a Welch Allyn Service Center should repair products out of warranty.

If you are advised to return a product to Welch Allyn for repair or routine maintenance, schedule the repair with the service center nearest you.

Returning products

When returning a product to Welch Allyn for service, ensure that you have the following information:

- Product name, model number, and serial number. This information may be found on the product and serial number labels.
- A complete return shipping address.
- A contact name and phone number.
- Any special shipping instructions.
- A purchase-order number or credit-card number if the product is not covered by a warranty.
- A full description of the problem or service request.

1. Obtain an RMA number. Contact Welch Allyn and request.

   Note: Welch Allyn does not accept returned products without an RMA.

2. Ship the device to Welch Allyn, observing these packing guidelines:

   Remove from the device the battery, all hoses, connectors, cables, sensors, power cords, and other ancillary products and equipment, except those items that might be associated with the problem.

   Dispose of damaged or leaking batteries in an environmentally safe manner consistent with local regulations.

Note: To ensure safe receipt of your device by the service center and to expedite processing and return of the device to you, thoroughly clean all residue from the device before you ship it to Welch Allyn. For cleaning requirements, see the Cleaning instruction in the Directions for Use.

Welch Allyn thoroughly cleans all returned devices on receipt, but any device that cannot be adequately cleaned cannot be repaired.

3. Write the Welch Allyn RMA number with the Welch Allyn address on the outside of the shipping carton.

Warranty service

All repairs on products under warranty must be performed or approved by Welch Allyn.

Refer all warranty service to Welch Allyn Product Service or another authorized Welch Allyn Service Center.

Obtain a Return Material Authorization (RMA) number for all returns to Welch Allyn Product Service.

CAUTION Unauthorized repairs will void the product warranty.

Non-warranty service

Welch Allyn Product Service Centers and Authorized Service Providers support non-warranty repairs. Contact any Welch Allyn regional service center for pricing and service options.

Welch Allyn offers modular repair parts for sale to support non-warranty service. This service must be performed only by qualified end-user biomedical/clinical engineers.

Technical Descriptions

Scale Technical Description

Welch Allyn Scales utilize the latest developments in electronic scales and microcomputer technology to provide weighing scales, engineered to be easy to use. This section describes the technical aspects of these scales.

LOAD CELL TRANSDUCERS

The function of the load cell transducer is to convert the weight applied to the weighing platform into an electrical signal for further processing and subsequent display by the readout. Welch Allyn uses proprietarily designed load cells in most of the scales to optimize performance and reliability. One of three types of load cell transducers may be used in your Welch Allyn Scale depending on the model number.

MODELS 5002, 5702, 6002

For many years these scales utilized a configuration called a “gauged-plate”. It is a rectangular, flat aluminum plate with a bending element in each corner. The bending elements are an integral part of the aluminum plate formed by cutting relief areas in the four corners. Each bending element has two resistive strain gauges bonded to it in order to form an electrical “half-bridge” configuration. The four bending elements are further interconnected to form an equivalent “Wheatstone bridge”. Additional compensating resistors are contained with the gauged-plate’s wiring to correct for temperature effects.

It is called a “gauged-plate” because it is a flat plate with resistive strain gauges installed on beams that have been machined out in the corners. The beams were mechanically tuned and matched with small files. This is a unique and special large flat load cell that allowed us to make a very low platform that is easy for unstable patients to step up on. It has served us well for over 35 years. We then invented the planar wingback bending beam with four strain gauges (full bridge).

This “gauged-plate” has been replaced in most scales with four discrete planar beam type load cells designed to accomplish the same performance as the single gauged plate. This was done in order to maintain costs. A further advantage is that a single load cell may now be replaced if necessary rather than the complete set of four. These

beams are electronically tuned and matched with precision resistors. Thus it is possible to replace one load cell without having to recalibrate the scale—another Welch Allyn unique feature.

Use of four bending elements or matched load cells sums the total weight applied to the weighing platform and produces an accurate result regardless of the patient's position on the platform.

READOUT ELECTRONICS

The Welch Allyn second generation scales employ the model 23005 computer instrument board and the 22DSDP display board. NOTE: Different revision levels of these boards may be incorporated in your scale depending on its manufacturing date. Differences between these boards will be noted in the description where applicable.

Readout electronics consist of the following:

- Differential signal amplification.
- Additional amplification and signal filtering.
- Analog-to-Digital (A/D) converter and Clock circuit.
- Battery and support circuitry, voltage regulators, power supplies, etc.
- Microcomputer and support circuitry.
- Display board.
- Printer assembly.
- Printer interface board.
- Printer controller board.

DIFFERENTIAL SIGNAL AMPLIFICATION

The weight dependent output signal produced by the load cell transducers in the weighing frame is a "differential signal", meaning it is the voltage difference between the "+ Signal" and "- Signal" leads. Integrated circuit U4, an instrumentation amplifier, is used to interface to this differential signal and amplify it.

The output signal from the load cells is applied to the protection network consisting of diodes CR4/CR5/CR6/CR7. These diodes prevent destructive high voltages caused by static discharges from damaging U4. A high frequency filter, formed by L1/L2/C9, C10 couples the weight signal to the input of U4. In U4 the differential signal is amplified by a factor of 100, and converted to a "ground-referenced" voltage for further processing.

Capacitors C16/C17/C24 provide local bypassing of the power supplies used by instrumentation amplifier U4. Capacitor C18 furnished compensation of U4 by reducing amplification at higher frequencies.

ADDITIONAL AMPLIFICATION AND SIGNAL FILTERING

Components for an optional second gain stage may be added on the printed circuit board. If included, operational amplifier U5 is used to provide additional gain and signal filtering. U5, together with capacitors C14/C15 and resistors R17/R18, forms an active low-pass filter. These components help to remove fluctuations in the weight signal caused by movement of the patient on the scale. U5, like U4, is "chopper-stabilized" to correct internal offset and drift errors.

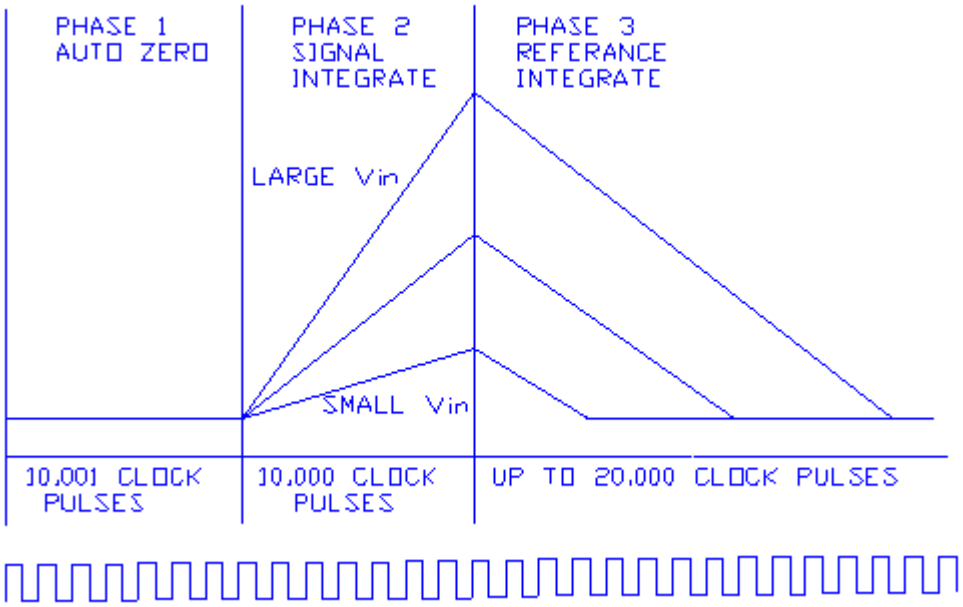
Resistors R24/R25 (optional) are used to increase gain; resistors R26/R27 (optional) are used to gain reduction. An additional low-pass filter stage furnished by resistor R34 and capacitor C23.

ANALOG-TO-DIGITAL (A/D) CONVERSION

Integrated circuit U6 is the analog-to-digital converter. Included on this integrated circuit are auto-zero functions, auto-polarity, and the digital and analog functions necessary to perform dual slope integration conversion to 20,000 counts (4-1/2 digits). The weight signal voltage is applied to the analog input (pin 10) of U6.

A reference voltage for the conversions is applied to pin 2 of U6. The reference voltage, nominally 1 Volt, is derived from the load cell transducer excitation voltage, by the divider network consisting of resistors R29, R30 and potentiometer P1. Adjusting p1 sets the "span" or weight calibration of the scale.

The system clock, applied at pin 22 of U6, is used to precisely time and control the phases of the dual slope conversion process. Refer to the converter time diagram when reading the following description.



A/D CONVERTER TIMING DIAGRAM PHASE 1, AUTO ZERO

During auto zero, the errors in the analog components (offset voltages of buffers, comparators, etc.) will be automatically nulled out. This action is performed by internal logic that disconnects the input pins (9 & 10) from the applied analog signal, connects them to ground, then closes an internal feedback loop such that offset error information is stored in the "auto zero" capacitor, C21. Also during this phase, "reference capacitor" C22 is charged to the voltage present on "Vref" (pin 2 of U6).

PHASE 2, SIGNAL INTEGRATE

The input signal is reconnected and then integrated for exactly 10,000 clock pulses. On completion of the integration period, the voltage V is directly proportional to the input voltage, corresponding to the weight applied to the scale. Capacitor C20 is the integration capacitor, with resistor R32 setting the integration current. At the end of this phase the input signal polarity is determined.

PHASE 3, REF. INTEGRATE, SIGNAL DE-INTEGRATE

The input to the integrator is switched from the input signal to reference capacitor C22. Internal switches connect capacitor C22 to the integrator input so that its polarity is opposite that of the previously applied input signal. This causes the integrator to discharge back towards zero. The number of clock pulses counted between the beginning of this cycle and the time when the integrator output passes through zero is a digital measure of the magnitude of the input signal. This count is stored in an internal latch on U6 for output to the microcomputer.

ZERO INTEGRATOR PHASE

One minor additional phase is included to insure that the integration capacitor C20 is fully discharged to zero volts. This typically lasts 100-200 counts.

CLOCK CIRCUIT

A clock is required for the A/D converter, integrated circuit U6.
23005 R01 board: Integrated circuit U2 is a dual timer circuit. One half (pins 8, 9, 12, and 13) is connected as an astable oscillator and used to generate a system clock for the A/D converter. Resistors R6, R7 and capacitor C2 set the clock frequency to approximately 150 KHZ.

23005 R02 board: A clock signal is generated internally in microcomputer U7 and appears on port pin "P1.0". The frequency is internally set by the microcomputer's software and is nominally 120 KHz.

POWER SWITCHING, VOLTAGE REGULATION AND SUPPORT CIRCUITRY

Depending upon their configuration, **WELCH ALLYN** second generation scales may contain disposable primary cells. (Note that some models may be specially ordered to utilize a different power supply than is normally provided; refer to the technical description that best matches the particular scale.) Additional circuitry is included to switch the battery supply, provide voltage regulation and detect low battery voltage conditions.

BATTERY SWITCHING

In order to conserve battery life, the battery supply is switched on and off as needed by the scale.

Main board: Transistor Q1 is a series switch which applies battery voltage to the remainder of the circuitry. Q1 is controlled by transistor Q2 which, in turn, is controlled by "watchdog timer" circuit U11.

To initiate power-on Q1 is turned on through momentary closure of membrane switch S9 ("**ON**") and diode CR10; diode CR13 is used to signal input pin "PB.7" of port expander U7 that the "**ON**" switch is pressed.

A secondary turn-on circuit occurs through diode CR12 and switch S3 ("**RE CALL**") to allow display of the previously stored weight if the scale is presently turned "off". The switch closure is also coupled through diode CR14 to signal input pin "PB.1" of port expander U7 that the "**RE CALL**" switch is pressed.

Once Q1 is on and voltage is applied to the circuit, watchdog timer U11 will keep transistor Q2 on through output line /WDO and resistor R5, subsequently keeping transistor Q1 energized. If no further action occurs, an internal timer contained within watchdog timer U11 will time-out after approximately 1.6 seconds and switch off Q2, causing Q1 to turn off and remove power from the scale's circuity.

Once energized and properly running, microcomputer U10 will keep resetting watchdog timer U11 by periodically pulsing U11's input line, labeled "WDI". Should the scale's operating program call for shut-off, or a hardware/software failure of microcomputer U10 occurs, the reset pluses to U11 will no longer occur and 1.6

seconds later U11 will time-out and cause the circuit power to switch off. The model 5102 has a jumper added at location J7; this causes U11 to reset U10 in the event of a hardware/software failure.

Resistors R1, R2, R3, R5 and R14 are included for proper circuit biasing. Capacitor C6 is used as an output filter.

VOLTAGE REGULATION

Voltage regulators VR1 and VR2 render regulated sources of +5 Volts DC for operation of the analog (VAA) and digital (VCC) circuits, respectively. Use of two separate +5V regulators helps to prevent noisy digital signals from entering the sensitive analog circuits. Capacitors C3 and C8 are used to insure regulator stability.

+9.5V/-7.5V SUPPLY

Integrated circuit U2 is used to convert +5 Volts DC to +9.5V and -7.5 Volts DC for use in the analog circuits. It contains an internal oscillator (operating at approximately 8 KHz) and a series of switches. During one half of the cycle capacitor C25 is connected between VAA and ground, charging C25 to VAA's potential of +5 Volts. During the other half cycle capacitor C25 is reconnected between the VAA and pin 8 (negative lead of C25 to VAA) so that its voltage adds to VAA and charges filter capacitor C26 to approximately twice VAA or 9.5 to 10 volts.

The remainder of U2 is used to generate a negative supply voltage. Capacitor C28 is connected between ground and the +9.5 Volt source on pin 8 during one half cycle of the internal oscillator. During the other half cycle, it is reconnected between ground and pin 4 such that its negative lead is connected to pin 4. This produces a negative voltage. Diodes Cr8 and CR9 reduce the voltage slightly to obtain the desired -7.5 volts.

BATTERY MONITOR

Integrated circuit U3 is included to monitor the voltage of the battery and provide an indication to the scale's operator when battery replacement is required. Two states of weak battery operation are detected; "low-battery" (battery is usable but will soon need replacing" and "low-low battery" (battery is too weak to properly operate the scale.)

Pins 1, 2 and 3 of U3 are connected to a voltage divider network consisting of R8, R9 and R10, to form the "low-battery" detector. The output of this circuit (pin 1) is normally low when the battery is good and switches high when the battery is low. It is coupled to the busy signal of U6 (pin 21) through resistor R36 to the driver for the front panel "**LO BATT**" indicator. This causes the "**LO BATT**" indicator to flash when the battery is low.

The remaining half of U3, pins 5, 6 and 7, are connected to resistors R11, R12 and R13 to form the "low-low" battery" detector. The output on pin 7, which is normally "high" with a good battery, goes "low" when the battery is too weak to reliably operate the scale. This output is connected to an I/O pin on microcomputer U10 to signal the microcomputer the "low-low" battery has been recognized. The microcomputer U10 will process the "low-low" battery signal and cause "**bAttrY**" to appear on the scale's front panel display, in addition to the flashing "**LO BATT**" annunciator.

MICROCOMPUTER AND SUPPORT CIRCUITS

To attain various additional features such as automatic zero tare, pounds/kilograms conversion, weight lock-in, previous weight memory, etc., a microcomputer is employed to additionally process the data supplied by the A/D converter. This microcomputer system consists of U10, a microcomputer; U7, a peripheral port expander to furnish additional input/output lines; U9, a non-volatile memory which stores the previous weight reading; and U11 (23005 R02 only), a device to generate reset conditions for the microcomputer.

During operation of the scale the microcomputer continually receives the weight readings from the A/D converter. This data is received in a "multiplexed" format (one digit at a time) from the output of the A/D converter

(microcomputer input lines P1.0 through P1.6). The microcomputer also continually scans the keyboard (using U7) looking for closed switches. If a key press is sensed, the microcomputer executes whatever action is called for in its program. After processing the A/D data, the microcomputer assembles it for viewing and transfers it to the front panel display.

U10 is a complete microcomputer, containing a software program stored in read-only memory, read/write memory for temporary storage of program variables, an arithmetic logic unit, input/output and other control lines, etc. Crystal XTAL1 and capacitors C29/C30 form the clock oscillator which controls the internal timing of the microcomputer.

PORT EXPANDER/KEYBOARD/BEEPER

Integrated circuit U7 is included to supplement the I/O (input/output) of the microcomputer system. U7 contains additional I/O lines (referred to as "ports"). Microcomputer U10 reads (from input lines) or writes (to output lines) data to U7 periodically by use of the data bus (lines DB0 through DB7) and the /RD and /WR lines.

The front panel keyboard is attached to some of U7's input port pins (PB.0 through PB.7, and PC.4). Resistor networks R42/R43 serve as "pull-ups" and keep the input pins at a "high" state (+5V) until a key switch is pressed; this pulls the respective input pin "low" (0V). The microcomputer will recognize this key press when it reads the input pins from U7 and if the key remains closed for number of milliseconds the microcomputer will execute that key's function.

A four position "DIP" (dual in-line package) switch, SW1, may be optionally included. It is connected to U7's "C" port, lines PC.0 through PC.3. It is used to select software contained in U7.

A small audio annunciator is driven by transistor Q3, which in turn is controlled by U7's output pin PA.7. The annunciator gives a short beep as audible recognition of a key being pressed. The length of the beep and its various sequences are controlled by U10's software. Additional output lines of U7 are used to control the driver for annunciator lamps on the display.

NON-VOLATILE MEMORY

The internal memory of microcomputer U10 does not retain data when the power is switched off. Because some features of the scale may require lasting data retention (such as last weight recall) integrated circuit U is included. This device, called an "electrically erasable programmable read only memory", or "EEPROM" will store selected information for periods of up to 100 years.

Information needed to be stored to or retrieved from U is sent in serial form using the lines SCL (serial clock) and SDA (serial data). These are controlled by microcomputer U10. A data bit (a high or low level) is sent and received on SDA when the SCL line provides a pulse.

Resistors R54/R55 are provided as pull-ups on the SCL/SDA lines to insure the data and clock pulses are properly shaped. Capacitor C36 improves power supply bypassing.

RESET GENERATION

In order for microcomputer U10 to properly execute its software instructions it must be initialized to the start of the program when power is first turned on. Reset pin 9 of U10 will accomplish this when it is set "high".

Main board: A reset pulse of approximately 200 mS is automatically generated by "watchdog timer" U11 when the Vcc level rises above 4.65 volts. If Vcc is below 4.65 volts, the reset line stays "high", keeping the microcomputer U10 in an inactive state. The reset pulse is also connected to port expander U7.

DISPLAY BOARD

Presentation of the weight information is performed by the model 700027W display board. It incorporates LED (light-emitting diode) digits and annunciators to provide a clear, bright, easy-to-read display.

The weight value is displayed on six, 0.43" high common cathode digits. These are driven in a multiplexed fashion (one digit on at a time) by LED driver U1. U1 receives the digit display information from the microcomputer's parallel data bus (DB0-DB7) and automatically performs the multiplexing function. Resistor package RP1 sets the operating current level for the displays.

A variety of LED annunciator lamps are contained on the front panel to indicate "**POUNDS**", or "**KILOGRAMS**", "**PRIOR WEIGHT**", and "**LO BATT**". These annunciator lamps contain multiple LED's to provide an evenly illuminated surface. They are driven by integrated circuit U2. U2 receives the on/off information for the annunciators from microcomputer U10 via port expander circuit U7. Resistor packs RP2 and RP3 provide current limiting for the annunciators. Display boards 22DSP R01, 22DSP R02 and 22DSP R03 are all equivalent in operation with some minor changes in board layout to improve spacing. Some minor differences in connections to the terminals of the resistor networks were also made to improve spacing.

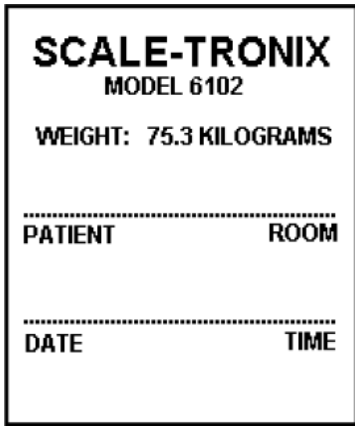
Printer General Description

SETUP

The optional printer assembly will normally be installed at the factory when your scale is produced and require no further attention during initial set-up.

PRINTER

On various model scales a digital paper tape printer can be supplied. The printer provides a convenient printed record of the weight. Space is provided on the tape printout to write in the patient's name or ID, Room number, and date. See the sample weight ticket printed below:



The printer will only print a valid weight. It will not print when the scale is reading "***0.0***" or is empty. It will Print the prior weight if that feature is currently activated. Press the front panel "**PRINT**" pushbutton to activate the printer. A single beep should be heard, then the printer will power-up and begin printing. A series of four (4) short beeps signifies that an invalid print request was made (weight not displayed on scale or a weight ticket already being printed). One long beep signals an internal problem with the printer, such as an out of paper condition, open print head or disconnected cable.

Printing may occur after the patient has left the scale. To print the previous patient's weight, press the "**RE CALL**" pushbutton followed by the "**PRINT**" pushbutton. The "**PRIOR WEIGHT**" annunciator will flash, and the scale's readout will display the previous patient's weight for a short time while the printing continues. The scale will not automatically shut-off until the printing is completed.

Various set-up options are available for the printer. These include "auto" print (weight is printed automatically on display), print only in selected units regardless of front panel display, etc. See the section pertaining to "**SET-UP**" in your scale manual for further information.

The printer is a modern thermal type using a specially coated paper. The paper should be 2¼" wide by approximately 1 7/8" in diameter. One roll of paper will produce about 500 weight tickets. No ink ribbons are required.

Paper is loaded through a removable access door on most scale models. Be sure to install the paper as shown in the illustration.

PRINTER TECHNICAL DESCRIPTION GENERAL

This internal printer employs a thermal type print mechanism, which heats a specially coated paper to produce the resulting weight ticket. The use of a thermal printing mechanism eliminates the need for ribbons or ink cartridges, and provides quiet, maintenance-free operation. The total printing system consists of two assemblies:

1.) Printer mechanism assembly with stepper motor and thermal print head
2.) Printer interface board assembly

PRINTER MECHANISM:

The printer mechanism employs a thermal print head consisting of a horizontal row of 384 small heater resistors. The thermal print head also contains driver electronics that receive the formatted print data and control the 384 heater resistors.

When any of the heater resistors are momentarily energized (powered for about 3 milliseconds) it will produce a small rectangular black dot on the thermal paper. Each printed character composition is 10 dots wide by 24 dots high. The paper width allows a maximum of 24 characters per line, which includes spaces between characters and paper edge margins. Printed characters are formed as a series of
horizontal lines. A stepper motor in the printer mechanism advances the paper after printing a horizontal line of dots, to print the next line of dots, or to advance the paper on blank lines. The printer mechanism also contains an optical paper sensor consisting of an infrared light emitting diode and matching phototransistor. Light from the diode is reflected off the surface of the paper and sensed by the phototransistor.

An optional switch is also included to sense when the thermal print head is in the open, paper loading position. The printer mechanism is serviced as a complete assembly and is generally not repairable.

PRINTER INTERFACE ASSEMBLY

The printer interface assembly is used to control the printer mechanism. It contains all the circuitry needed to interface to the printer mechanism, scale's electronics, and battery/power supply. For technical explanation purposes it can be divided up into the following sections:

1.) Printer voltage regulation
2.) Microcontroller & support circuitry
3.) Interface to scale electronics
4.) Interface to thermal print head
5.) Interface to stepper motor
6.) Thermal print head temperature measurement
7.) Paper sensing and head position.
8.) Dip switch options

PRINTER VOLTAGE REGULATION

The printer mechanism and its electronics require a source of +5Vdc for operation. To increase battery life, the printer is only powered up when needed. Integrated circuit voltage regulator U201, an LTC1963, is employed to regulate the varying battery voltage to a constant +5V dc.

Input voltage to U201 is applied at connector J201. U201's output voltage is set by the resistor divider R210 and R211. U201 has internal current limiting and reverse battery protection, and has a switchable output controlled by an on/off terminal. Capacitors C201, C202, C205, and C206 provide filtering and insure regulator stability. Additional capacitors C207 and C210 are included to provide distributed filtering.

A series transistor switch network consisting of Q202 and Q203 is used turn the U201 regulator on when printer operation is required. Transistor Q202 is turned on when the scale's instrument board powers up and the RXD raises to a "high"; it remains on the entire time that the scale is on. Transistor Q203 is turned on when the scale's instrument board sets the RTS line "high", it is activated only when printing is desired.

Resistors R204, R205, R206, and R207 bias Q202 and Q203. Capacitors C203 and C204 are included to form time delays to prevent the printer electronics from inadvertently turning on as the scale powers on or off. R209 is included to keep U201's on/off terminal at ground potential until switched on.

An additional circuit to turn the printer on is the manual paper advance switch S201. One set of S201's contacts is used to apply battery voltage to U201's on/off terminal through resistor R208. The other set of S201's contacts is connected to microcontroller U202 to indicate that a paper advance is requested. On the 500057-B printed circuit boards, R220 is included to provide additional pull-up bias.

PRINTER MICROCONTROLLER & SUPPORT CIRCUITRY

Microcontroller U202 is included to perform all the data manipulation and timing required to make the printer mechanism work. It contains RAM (random access memory), a flash ROM (read only memory) with program software, I/O (input/output) ports, a UART (universal asynchronous receiver/transmitter) and the needed arithmetic logic, clock generating, and associated internal logic.

U202's internal software is loaded into the device through the ISP (in-circuit serial programming) port at J205 during manufacture.

A clock circuit for U202 is formed from crystal XTAL201 along with capacitors C208 and C209.

Reset supervisor U205 is provided to initialize microcontroller U202 on power up. U205 measures the circuit power supply and keeps U202's reset line high until the proper operating voltage has been reached. C212 determines the width of U205's reset pulse. R218 keeps U205's reset input biased high until pulled low for in circuit programming.

An 8-position dip switch assembly is attached to one port of U202 to allow operating options to be set.

D202, a bi-color (red/green) LED is used to indicate printer status. Internal software in U202 determines the operation of the LED. Resistor R212 sets the operating current for D202.

PRINTER INTERFACE TO SCALE ELECTRONICS

The printer electronics are powered "on" when the scale's electronics set the "RTS" line high on J202. The "RXD" will have been set high prior to the RTS line. This gates on the series transistor network of Q202 and Q203, turning on voltage regulator U201.

Data to be printed is transmitted to the printer through J202's "TXD" line. Data is sent in ASCII serial format at 9600 bauds. A data bit is about 104uS in length. Word length is 8 bits, no parity, at TTL levels (0 to 5V). Data is buffered by sections of U206, a Schmitt trigger inverter. Resistors R201 and R202 are included for protection and circuit bias.

Printing begins once U202 receives a carriage return ("CR", ASCII 13) byte. While busy printing U202 will halt data transmission between the scale and printer by setting the "CTS" (clear to send) line of J202 high. The scale's electronics will recognize this and stop transmission until CTS goes low again. Diode D201, resistor R203 and sections of U206 are used to interface to the CTS line.

PRINTER INTERFACE TO THERMAL PRINT HEAD

Microcontroller U202 takes the character print data (letter, number, etc.) from the scale and then converts it into the appropriate dot pattern to form letters and numbers on the paper. This is a complex process executed by U202's internal software. Dots that need to be printed on the paper are set to a "1" level; blank dots are set to a "0" level.

Once converted, the resulting dot data string is transmitted in serial format through the "DI" (data in) line as the "CLK" (serial clock) line is pulsed. Once all 384 bits (1 per dot) have been sent, the "/LAT" (latch) line is pulsed to load the data into the thermal print head. The process is similar to manipulating a digital logic shift register. The thermal print head contains the appropriate logic interface and current drivers to operate the heater resistors.

Because of the current required per dot (about 35mA) only a limited number of dots can be energized at one time to avoid overloading the scale's power supply. This is accomplished by dividing the thermal head's heater resistors into segments by use of the STB1, STB2, STB3, and STB4 (strobe 1, strobe 2, etc.) lines.

Note that STB2 and STB3 are joined together to divide the heater resistors into three, 128 heater resistor segments. U202 also controls the maximum number of heater resistors energized by assemblies using limiting the number of "on" dots in the dot data string sent to the thermal head.

With the dot data now loaded into the thermal print head, microcontroller U202 controls the length of time the heater resistors are on, typically around 3-4 mS, to form the dot image on the paper. Microcontroller U202 calculates this based on the temperature of the thermal print head, which is measured by a thermistor embedded in the head. U202 will pulse mosfet transistor Q201 to provide power for the heater resistors to match the interval required. This is repeated as necessary with the various STB sections until all the required dots on a single line are formed.

Resistors contained in RN201 provide pull-up bias on the various logic interface lines to insure a fast transition.

PRINTER INTERFACE TO STEPPER MOTOR

The printer mechanism contains a stepper motor to advance the paper during printing and paper feed. The stepper motor is driven by a separate IC designed for that purpose, U203, and is connected to lines OUT1, OUT2, OUT3, and OUT4. The stepper motor requires various combinations of high and low logic signals from U203 in order to rotate.

U202's operating software generates these combinations. A section of Schmitt trigger inverter U206 is used to enable U203 and insure the stepper motor is off while the microcontroller is reset.

To provide manual paper advance for paper loading, switch S201 is included. One section of S201 is used to turn on regulator U201 and provide circuit power; the other section is connected to microcontroller to U202 to request a paper advance. U202 will then provide the correct signals to U203 to operate the stepper motor and advance the paper.

PRINTER THERMAL PRINT HEAD TEMPERATURE MEASUREMENT

The temperature of the thermal print is measured to determine the correct "on" timing of the heater resistors. An NTC thermistor is embedded in the thermal print head and changes its resistance based on the print head's temperature. U204, a 10 bit (1 part in 1024) A/D (analog to digital) converter is included to measure the voltage developed by the divider formed of R217 and the thermistor connected at "TM".

U204 converts the thermistor voltage from an analog value to a digital number, and passes it to microcomputer U202.

Assemblies employing the 500057-A printed circuit board: The converted temperature value is passed to microcontroller U202 in I2C serial format via use of data (SDA) and clock (SCL) lines. Resistor R219 and capacitor C211 provide filtering of the temperature signal. Resistors contained in RN201 provide pull-up bias for the SDA and SCL lines.

Assemblies employing the 500057-B printed circuit board: The converted temperature value is passed to microcontroller U202 in SPI serial format via use of data (Dout) and clock (CLK) lines. When U204's chip selects (/CS) line is pulled low by U202 the conversion process begins. Capacitor C211 provides filtering of the temperature signal.

Resistors contained in RN201, along with resistor R220, provide pull-up bias for the Dout, CLK, and /CS lines.

PRINTER PAPER SENSING AND HEAD POSITION

The printer mechanism contains an optical paper sensor consisting of an infrared diode emitter and a complimentary phototransistor. Light from the infrared emitter reflects off the paper and is detected by the phototransistor at connector J207. Microcontroller U202 uses this signal to determine the presence or absence of paper and take action accordingly. The infrared emitter is pulsed on by U202 to conserve battery and emitter life.

One section of U206 is used to process the detected signal before application to U202. Resistor R214 sets the operating current of the emitter. Resistor R215 provides the phototransistor load.

A snap action switch is incorporated within the printer mechanism to determine whether the thermal print head is open for paper insertion or closed for printing. Resistor R206 is included for circuit protection. A section of S202 parallels this switch so that mechanisms not equipped with this switch will operate properly.

PRINTER DIP SWITCH OPTIONS

An 8-position dip switch is included to allow troubleshooting and some adjustments to operating parameters. Note that the settings below may vary slightly depending on the current software revision.

For normal default operation all switches should be “OFF”. Use a fine tip ballpoint pen to actuate the switches as follows:

S202-1: Puts printer in test mode. When “ON” and the paper advance switch is pressed, the printer will display the software version, date, and other dip switch options. If the paper advance is held long enough the printer will produce a variety of printable characters. When S202-1 is “OFF” paper advance operation is normal.

S202-2: Sets maximum number of simultaneous dots to be printed. With S202-2 “OFF” the maximum number of dots is 12. With S202-2 “ON” the maximum number of dots is 30. While increasing the maximum number of simultaneous dots produces faster print speeds, it also increases power consumption and reduces battery life. S202–2 “ON” should only be used with scales that have rechargeable battery packs.

S202-3 & S202-4: Increases resistor heater on time to improve printing contrast. May need to be adjusted depending on paper type. Adjustment as follows

S202-3 “OFF” & S202-4 “OFF” : 100%
S202-3 “OFF” & S202-4 “ON” : 115%
S202-3 “ON” & S202-4 “OFF” : 133%
S202-3 “ON” & S202-4 “ON” : 150%

Note that increasing the on time will slow the printing slightly and decrease battery life. Setting should be at the minimum consistent with good print results.

S202-5: Bypasses head temperature sensor circuitry and provides fixed resistor heater pulse width. Used for troubleshooting only.

S202-6 & S202-7: Not used
S202-8: Bypasses thermal head position switch. Used for printer mechanisms without head position switch or for troubleshooting.

Maintenance of Scales

Routinely perform the following preventive maintenance to keep your scale in working order.

1. Check the calibration annually

2. Inspect the scale for cracks or loose mounting hardware. Replace or repair as necessary.

3. Visually inspect the scale enclosure for damage or loose or missing hardware.

4. Replace or repair as necessary.

5. If equipped, inspect the AC line cord for abrasions or other signs of wear.

6. Do not expose the scale to excessive water or moisture.

7. Do not store the scale where heavy objects can be placed on it.

8. Replace the batteries annually or as required.

9. Do not service or perform maintenance while the scale is in use with a patient.

Battery replacement

CAUTION Use only size D disposable alkaline batteries.

1. Using a screwdriver, remove the two fasteners on the access door located on the rear of the mast and remove the door.

2. Install six new batteries in the battery holder. Make sure to follow the polarity instructions.

3. Re-attach the access door.

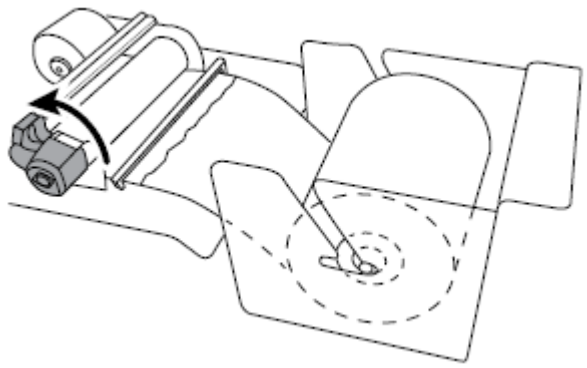
Change the printer paper

1. Use a screwdriver to loosen the screw on the printer access door.

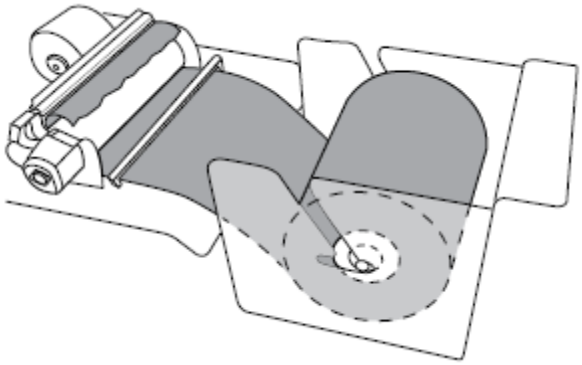
2. Remove the spindle containing the empty printer paper roll from the printer paper well.

3. Replace the printer paper roll in the spindle. Make sure the new printer paper is advancing from the bottom of the roll.

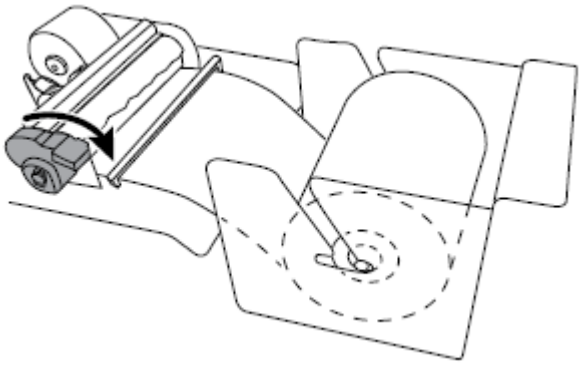
4. Lift the green knob to lift the print head lever.



5. Insert the paper through the paper guide slot, and make sure it goes under and around the black roller bar.



6. Pull the paper under the print head lever and push the green knob down to push the print head lever down.



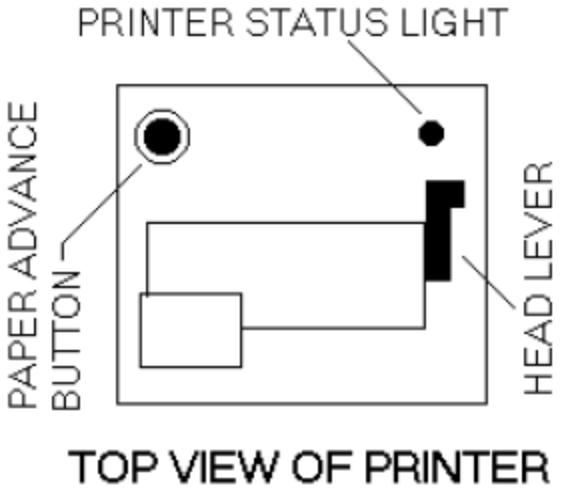
7. Press **PAPER ADVANCE** to move the paper through the printer.

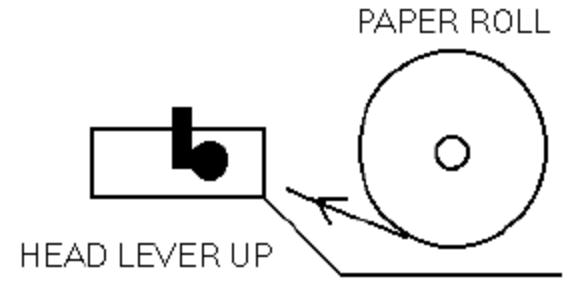
8. Install the printer access door, and advance the new paper through the slot on the door.

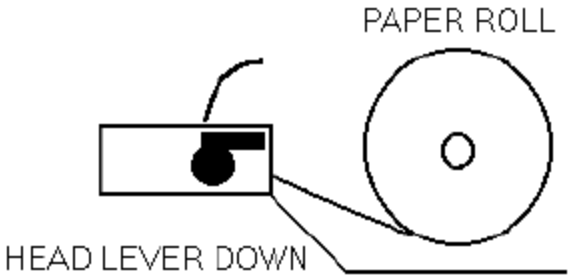
9. Install the screw on the printer access door

Note: Never pull or force paper through the printer mechanism with the head lever in the "down" (or closed) position. Never insert any object besides paper into the printer head assembly. Damage to the print head can occur.

If problems occur with the printer, check the condition of the printer status light located on the printer assembly. Press the paper advance switch to power up the printer and activate the lamp.







Calibration of Scale

Your scale has been carefully calibrated at the factory. This calibration involves matching and tuning of the load cells and readout electronics. The scale calibration should be checked annually. Only use calibrated, certified test weights for this purpose. Traction or physical therapy weights are **NOT** acceptable since their actual weight can often be in error as much as +/-10%. Calibration weights may be purchased from **WELCH ALLYN** or a local scale dealer. An alternative to calibration weights is the weight comparison method. This requires a known accurate, calibrated scale. A fixed weight is "weighed" on the calibrated scale then the same weight is placed on the scale for comparison.

TEST CALIBRATION WEIGHTS ARE AVAILABLE FROM WELCH ALLYN.

THREE (3) 25 KILOGRAM TEST WEIGHTS ARE RECOMMENDED.

ORDER PART NO. 20021W. (25 KG TEST WEIGHTS)

Large changes in calibration often indicate a damaged load cell or faulty readout component. It is generally recommended that if calibration is necessary for your scale it should be returned to the factory. Calibration procedure follows for those situations where it is not desirable. Calibration should not be attempted by those not having the proper tools or knowledge of electronic systems and their attendant shock hazards.

Calibration Procedure

Enter the "calibration mode" by following **exactly** the procedure outlined below:

1. Be sure scale is off.
2. Press and hold in the "**RE WEIGH**" pushbutton.
3. While pressing the "**RE WEIGH**" pushbutton, press and release the "**ON**" pushbutton. On scales that do not employ the "**ON**" pushbutton, such as the model 5102, turn the power rocker switch on while pressing "**RE WEIGH**".
4. NOTE: The "**ST**" pushbutton is a special hidden programming and test pushbutton located under the **WELCH ALLYN** logo ("**ST**") on the left side of the front panel between the "**ZERO**" and "**RE CALL**" pushbuttons. After the scale displays the test pattern of "**888888**" release the "**RE WEIGH"** button and press the "**ST**" pushbutton five (5) times. This will cause the readout to enter the calibration mode. The display will indicate "**CAL**".
5. Press the "**ST**" pushbutton once more; the display will indicate "**A-d**". This indicates the start of the "raw" analog-to-digital converter data being inputted to the microprocessor.
6. Press the "**ST**" pushbutton one more time. The number displayed is now the raw analog to digital data.
7. The automatic turn-off timer has also been programmed for an extended "on" period to give you time to calibrate the scale. This time period is three minutes. The scale may be turned off before this time period by simply pressing and holding the "**ON**" pushbutton. Hold it in for several seconds until the power shuts off. If additional time is needed to complete the calibration procedure, press the "**ON**" pushbutton briefly. This will reset the timer for an additional three minutes.

The readout is displaying a number, which represents the zero offset value of the platform and load cell transducers, in tenths of pounds (0.1 pound). Note and record this value. (Even though your scale may be "kilograms only" in operation, pounds are used internally because of their finer resolution.) Units conversion is as follows:

1.0 kilogram = 2.2 (2.2046) pounds
5.0 kilograms = 11.0 (11.0231) pounds
10.0 kilograms = 22.0 (22.0462) pounds
25.0 kilograms = 55.1 (55.1156) pounds
50.0 kilograms = 110.2 (110.231) pounds
100 kilograms = 220.4 (220.462) pounds

Add the specified test weight to the platform. Note the new number displayed. Subtract the original zero offset value from this new number to obtain the scale's displayed value of the calibration weight.

NOTE: Early versions of the software did not display the decimal point in the a-d calibration mode, i.e.: 11.7 pounds is displayed as "117".

Example: The zero offset value is "11.7" (representing 11.7 pounds). Adding the specified three 25-kilogram test weights (equivalent to 165.3 pounds) to the platform produces a reading of "177.1" The difference is 177.1-11.7=165.4 (equivalent to 165.4 pounds). This would indicate the calibration is 0.1 pound "high".

Using the specified three 25-kilogram test weights, a difference of 165.3 +/-0.1 pound should be obtained. If necessary, adjust potentiometer P1 (span adj.) on the instrument board until the correct value is obtained. Remove the test weight and recheck the zero offset value. Note that adjusting P1 may also alter the zero offset value. Repeat the process as necessary to obtain the correct difference.

Now you may turn the scale off by pressing the "**ON**" pushbutton and holding it in for a few seconds. That will force it to turn off. You may also wait for it to time out and turn off by itself.

DATA OUTPUT (RS232) DETAILS

For detailed help and information regarding the data output capabilities, contact **Welch Allyn**. RS232 data output has been made a standard feature on many of our scales in 2013. Existing scales can be easily modified to provide data output when needed. Consult Welch Allyn for details.

Masted Scales Disassembling Guide

Required tools:

- 5/32” Allen wrench
- 1/8” Allen wrench
- 9/16” Open end wrench
- ½” Open end wrench
- 5/16” socket
- 10 mm socket
- 11 mm socket
- Small slotted screwdriver
- Small Philips screwdriver
- #1 Phillip screwdriver
- ¼” Ratchet driver with extension
- 10 mm nut driver
- 5 mm nut driver

Power down the scale and remove any A/C power

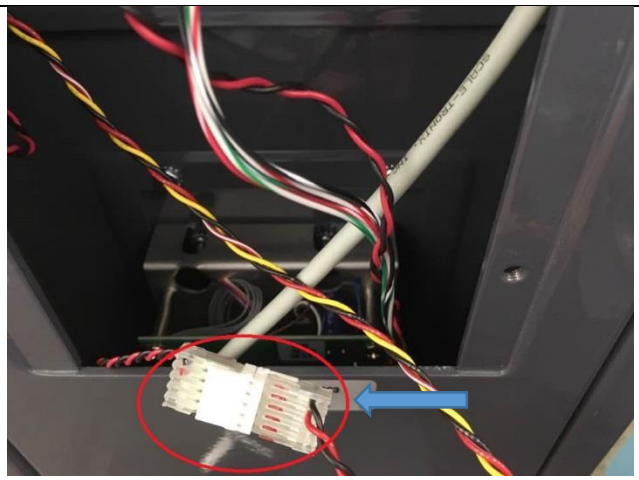
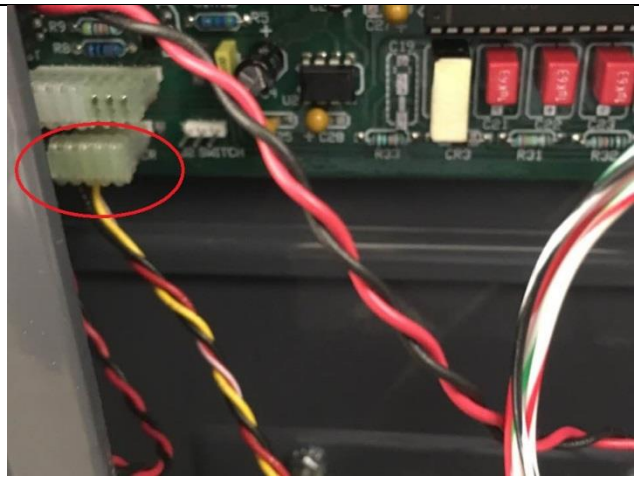
CAUTION: Do not apply extra force to the base of the scales. The load cell capacity can overload and cause damage to the load cells.

Note: Whenever the scale is opened for repair purposes a Calibration must be performed.

5002, 6002, 6702, 6702SP, 6702W MAST Disassembling

MAST with AC Power Option:

1. Mast with AC power option only: Use a 1/8” Allen wrench to remove the two screws on the power access door	
2. Remove the power cord from the IEC power connector	

3. Disconnect the wiring harness	
4. Disconnect the power jack	
5. Disconnect J1	

6. Use a 10 mm socket to remove the nut on the access panel	
7. Use a #1 Phillip screwdriver to remove the screw on the access panel so the power supply can be removed	

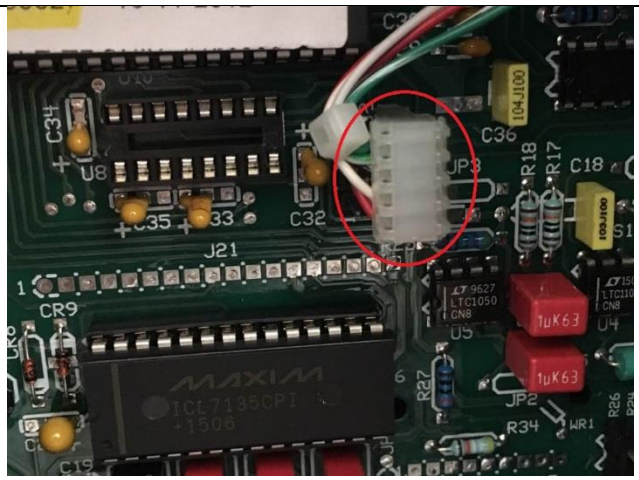
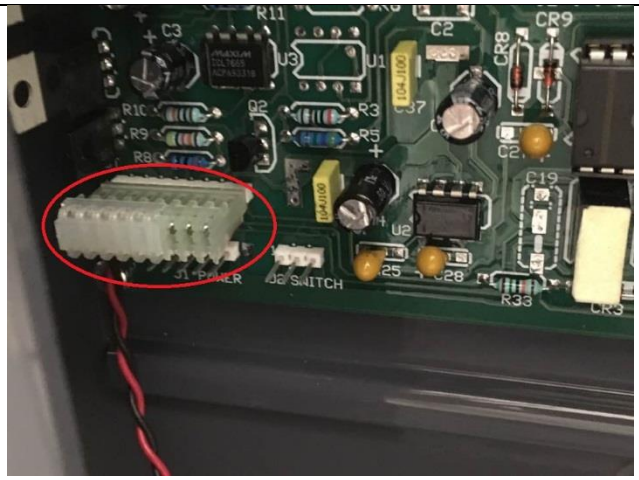
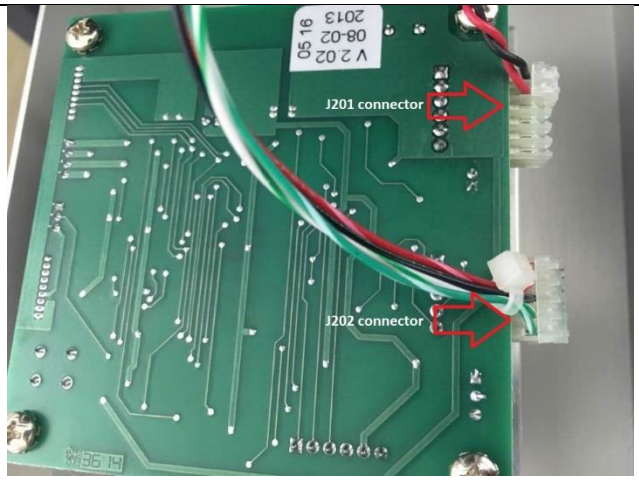
MAST with Battery Option:

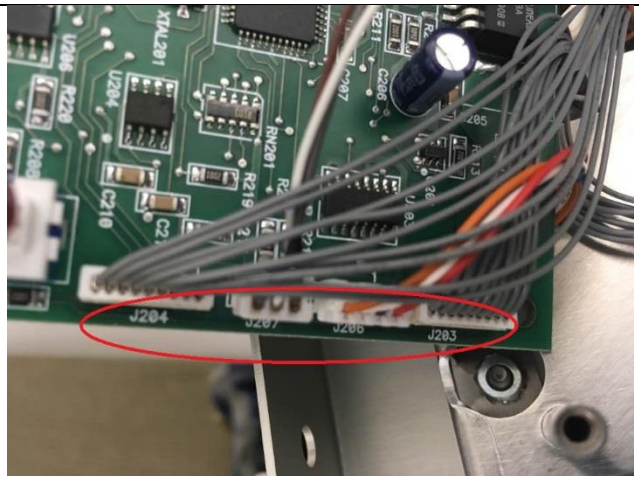
1. Mast with battery operated option only: Use a #1 Phillip screwdriver to remove the two screws on the battery access door to remove the door	
2. Remove batteries	
3. Use a #1 Phillip screwdriver to remove the four screws on the battery holder assembly	

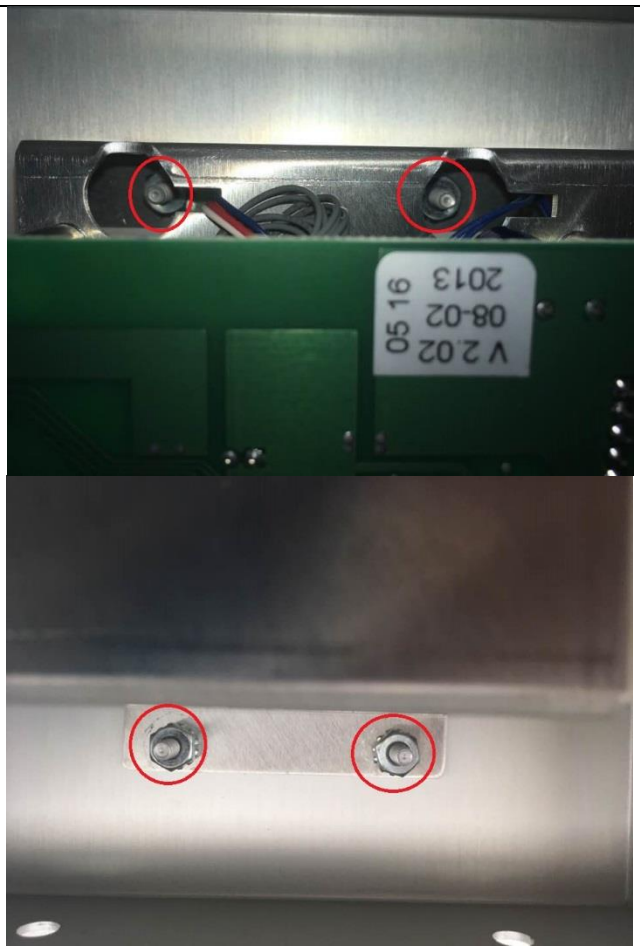
4. Separate the J1 Power cord (in black and red) from the gray cable so the battery holder can be removed completely	

MAST with Printer Option:

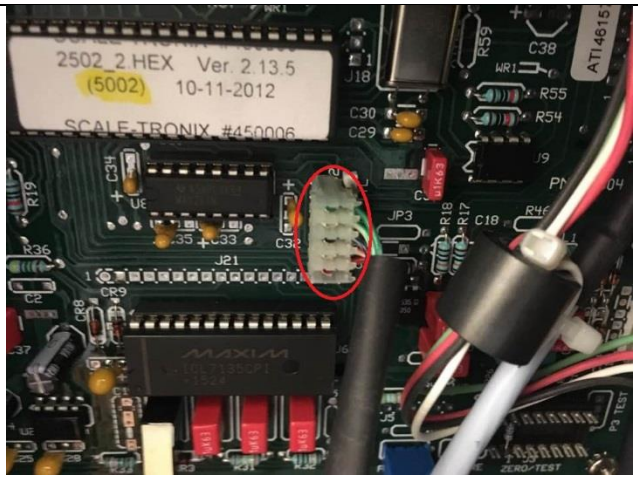
1. Mast with a printer option only: Use a 5/16” socket to remove the nuts on the printer assembly panel	

2. Disconnect J15	
3. Disconnect the wire harness	
4. Disconnect J201 and J202	

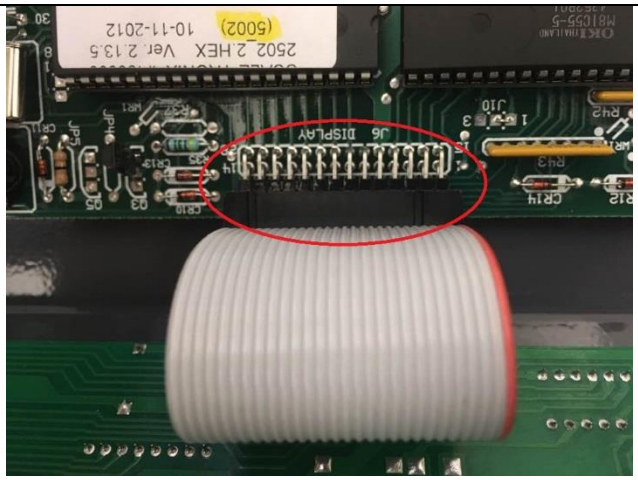
5. Use a #1 Phillip screwdriver to remove the screws	
6. Disconnect J204, J207, J206, J203	
7. Use a #1 Phillip screwdriver to remove the screw on the printer access door	

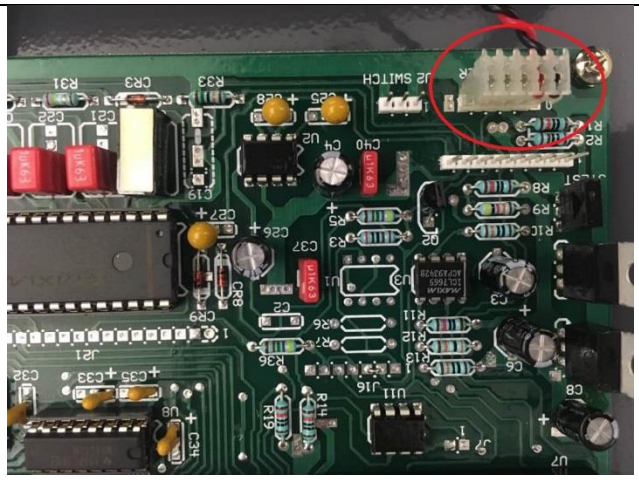
8. Use a 5/16” socket to remove the nuts on the printer mechanism assembly four screws	

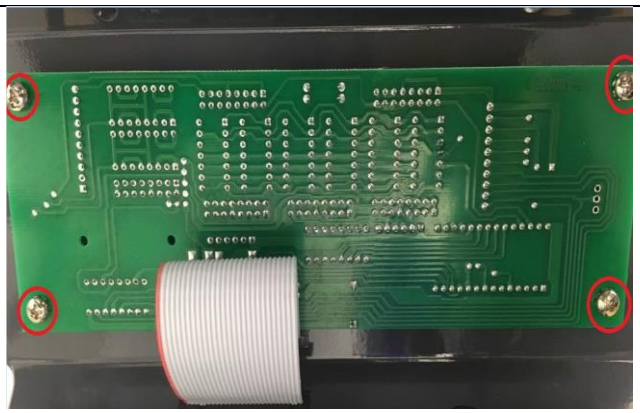
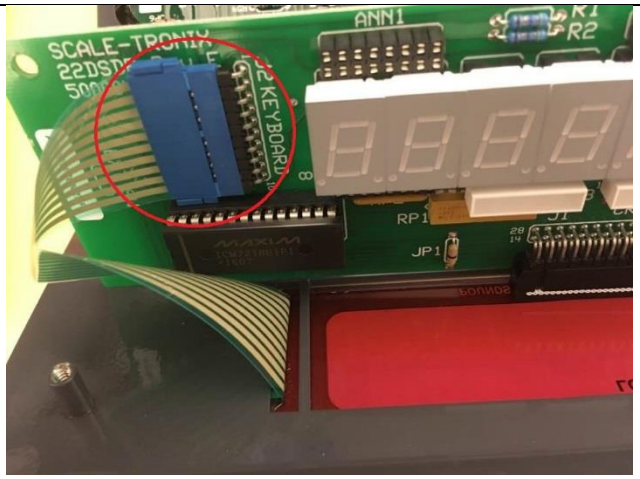
MAST with RS232 Option:

1. RS 232 port disassembly: Use a 1/8” Allen wrench to remove the two screws on the RS232 port access door	
2. Disconnect J14	

MAST Readout Disassembly:

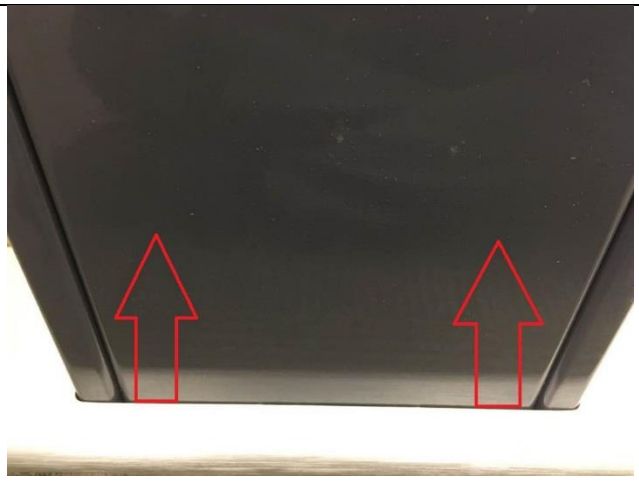
1. Readout Disassembly: Use a 1/8” Allen wrench to remove the two screws on the readout panel cover. Remove the cover by lifting it up to reveal the readout board	
2. Disconnect J6	
3. Disconnect J4	

4. Lift the black clamp to remove J4	
5. Disconnect J1	
6. Use a #1 Phillip screwdriver to remove the screws on each corner of the board	

7. To remove the switch assembly, use a #1 Phillip screwdriver to remove the four screws	
8. Unplug the blue-ribbon cable	

MAST Removal:

1. Mast Removal: Use a 3/8” Allen wrench to remove the two screws on the cover panel	

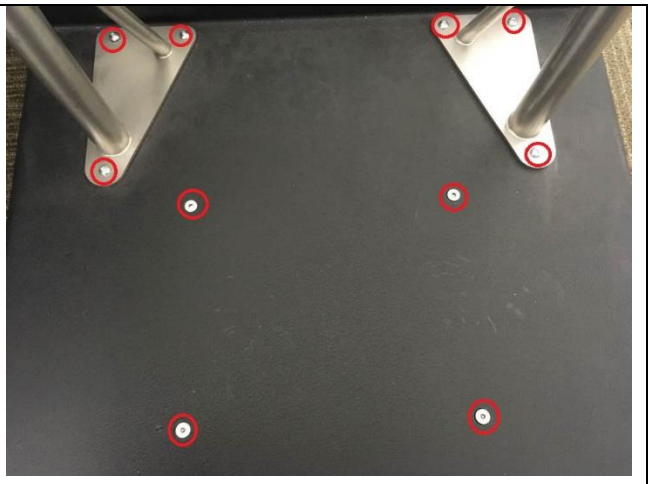
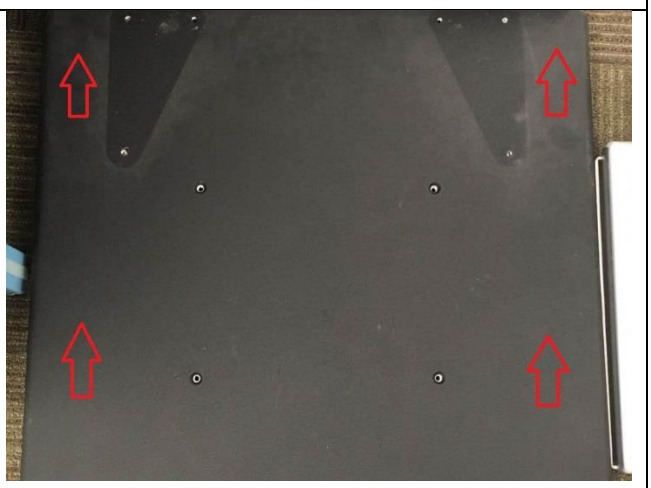
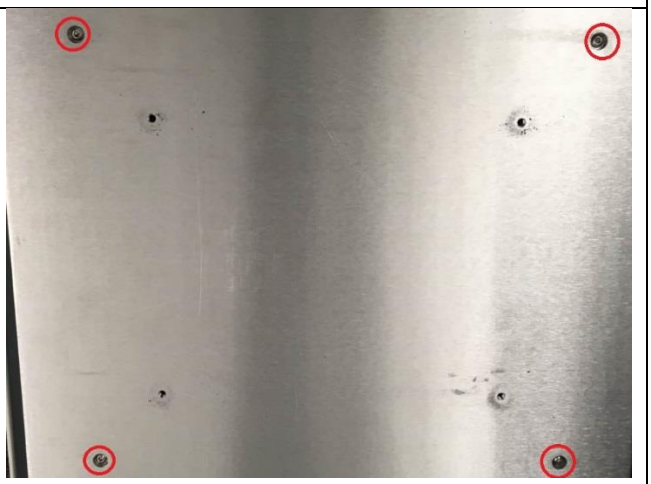
2. Use a small screwdriver to remove the two screws on the blue connector	
3. Use a 9/16” wrench to remove the two hex bolts on the mast’s bottom	
4. Pull the mast from the base	

5002, 6002, 6702, 6702SP, 6702W Disassembling

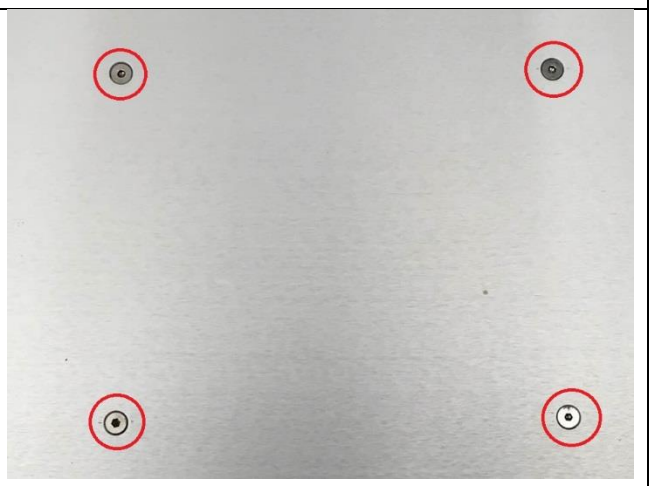
5002 Top Plate Disassembly:

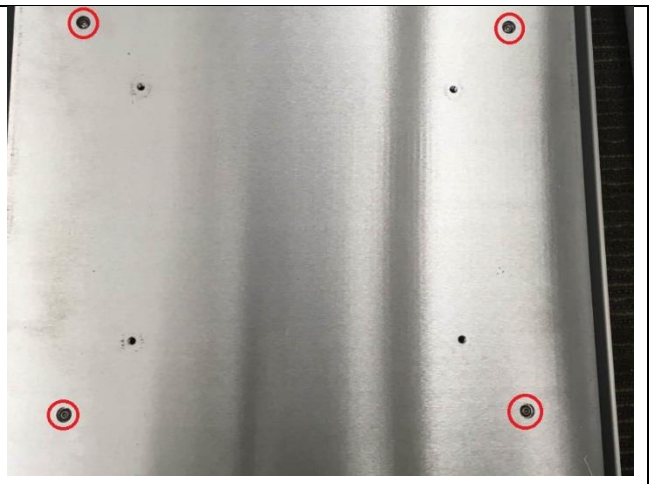
1. 5002 Top Plate Disassembly: Use a 5/32” Allen wrench to remove the three screws on each handrail (if equipped)	
2. Remove the dust cover	
3. Use a 1/8” Allen wrench to loosen the four screws on the top plate <u>NOTE:</u> When reassembling the top plate, remember to turn the screws back 90^0 so the deck can float.	

5702 Top Plate Disassembly:

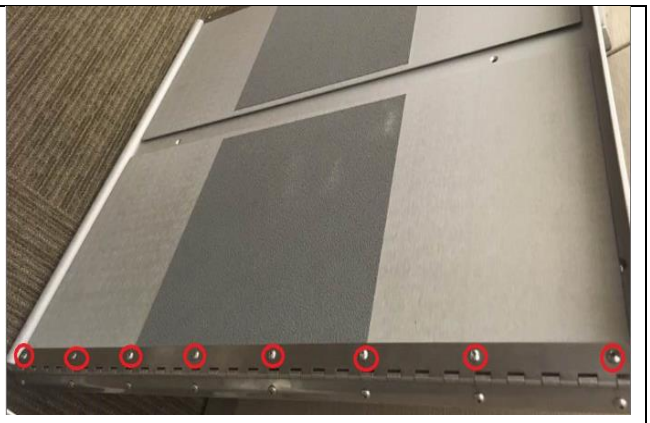
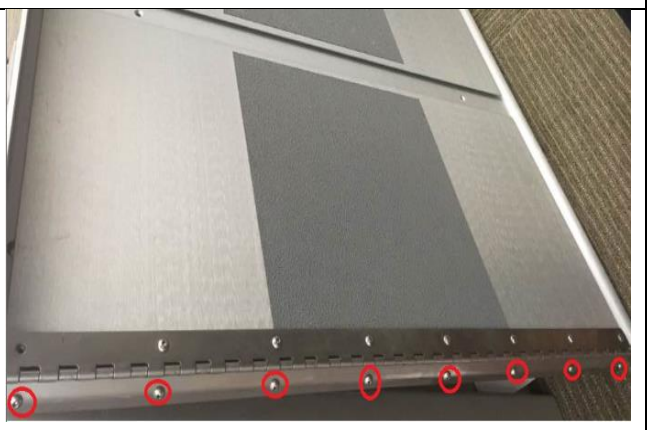
1. 5702 Top Plate Disassembly: Use a 5/32” Allen wrench to remove the three screws on each handrail (if equipped) and the screws on the slider deck top cover	
2. Remove the dust cover	
3. Use a 1/8” Allen wrench to loosen the four screws on the top plate <u>NOTE:</u> When reassembling the top plate, remember to turn the screws back 90^0 so the deck can float.	

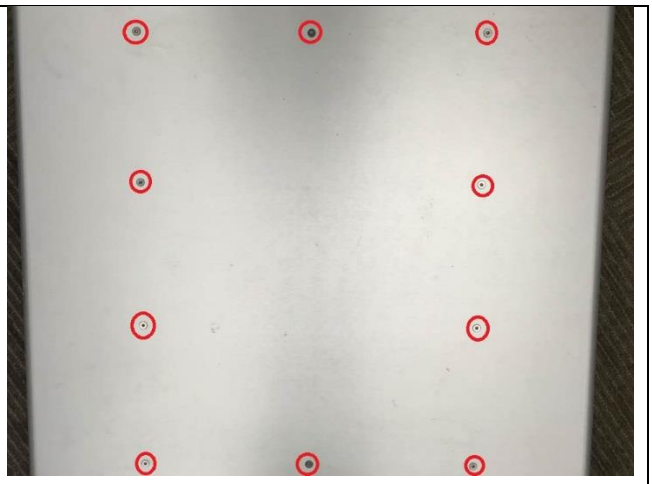
6002 Top Plate Disassembly:

1. 6002 Top Plate Disassembly: Use a 1/8” Allen wrench to remove the 7 screws on each bracket	
2. Use a 1/8” Allen wrench to remove the additional 7 screws on the side of each bracket	
3. Use a 5/32” Allen wrench to remove the four screw on the deck	

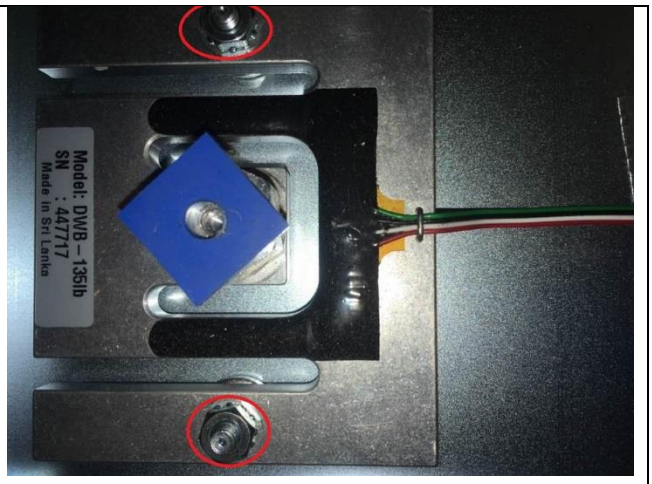
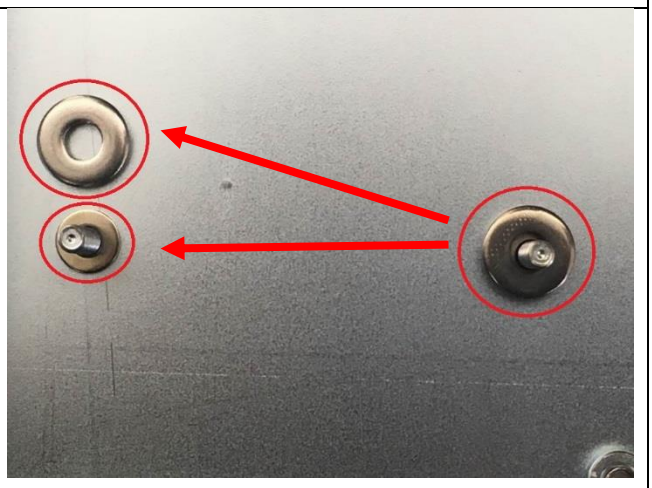
4. Use a 1/8” Allen wrench to remove the four screws on the top plate NOTE: When reassembling the top plate, remember to turn the screws back 90^0 so the deck can float.	

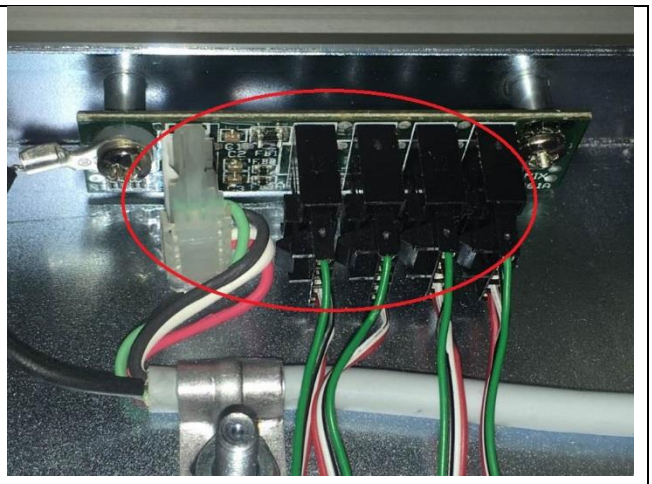
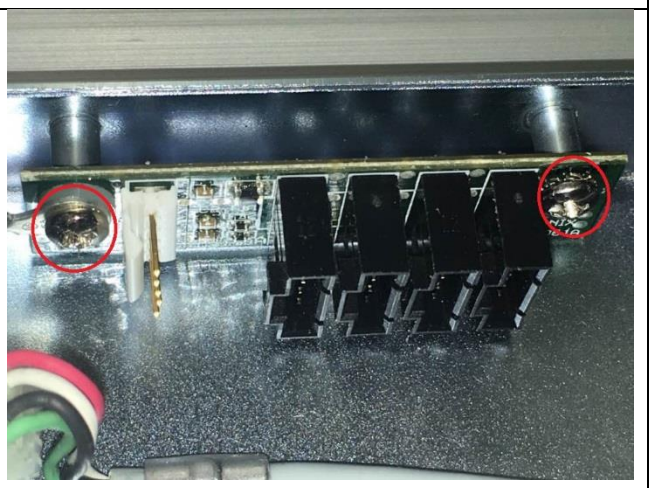
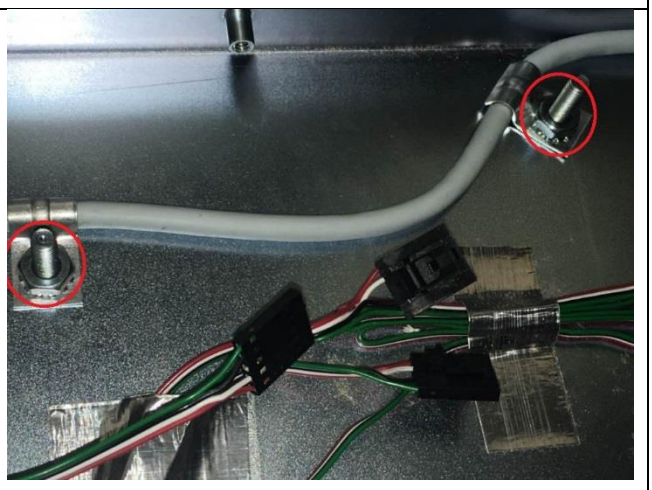
6702W, 6702, 6702SP Top Plate Disassembly:

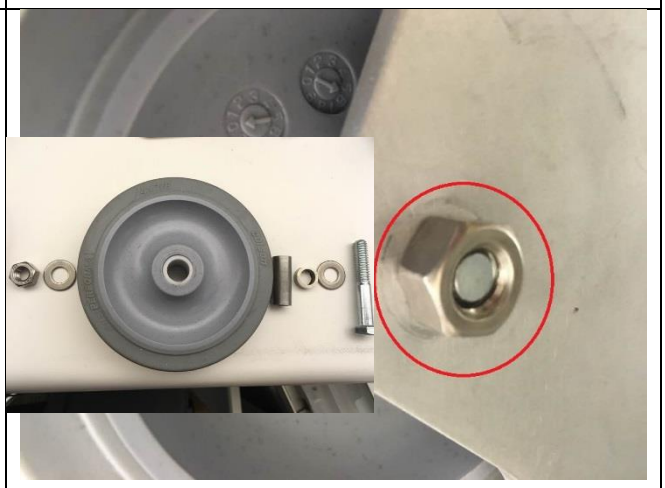
1. 6702W, 6702, 6702SP Top Plate Disassembly only: Use a 1/8” Allen wrench to remove the 8 screws on each hinge	
2. Use a 1/8” Allen wrench to remove the additional 8 screws on the side of each hinge	

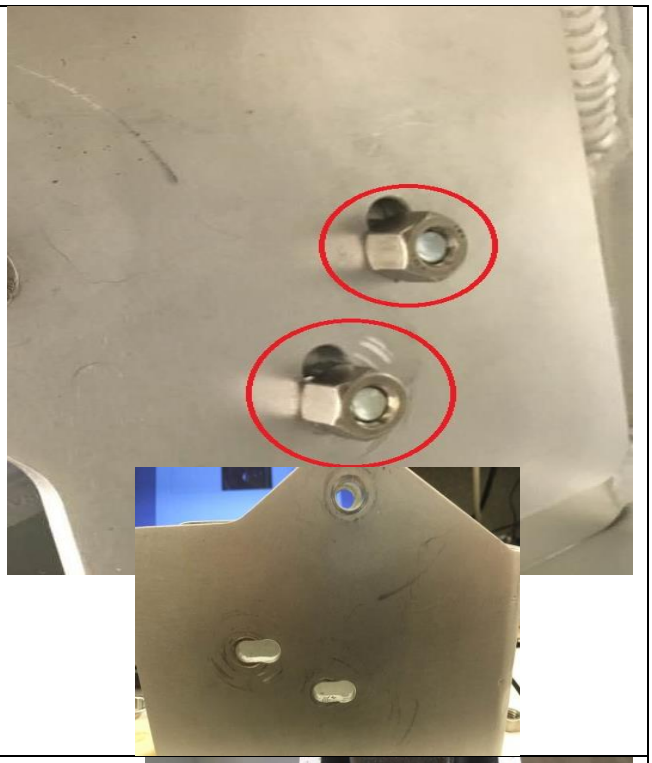
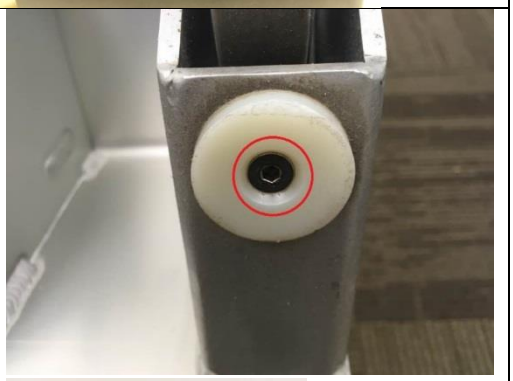
3. Use a 5/32” Allen wrench to remove the screws on the top plate 10 (6702W & 6702SP) or 14 (6702)	

5002, 5702, 6002 Base Disassembly:

1. 5002, 5702, 6002 Base Disassembly only: Use a 10 mm socket to remove the two nuts on each load cell <u>NOTE:</u> Remove the tape or cable clamps that hold the load cell and the cable in place to the weldment	
2. Remove the washers under each load cell	

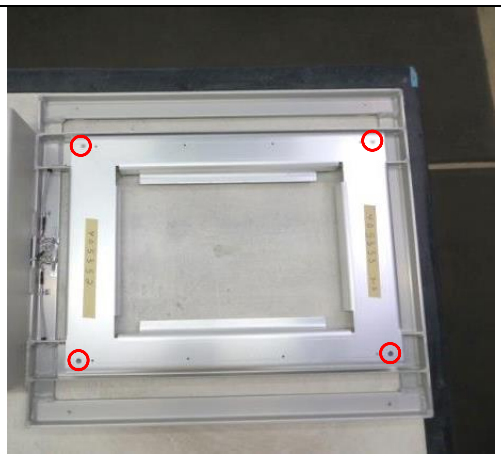
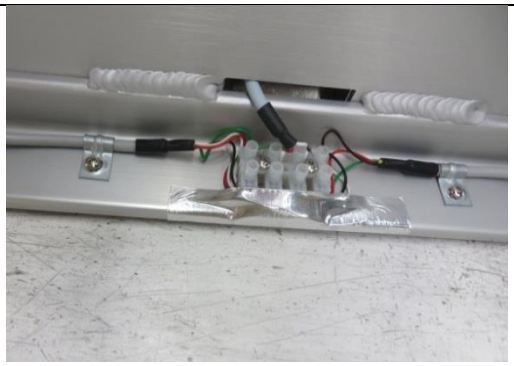
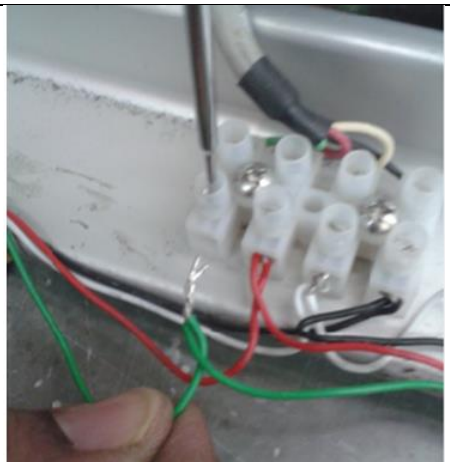
3. Disconnect the wire harnesses from the junction board	
4. Use a #1 Phillip screwdriver to remove the screws on the junction board	
5. Use a 10 mm socket to remove the screw on the two cable clamps	

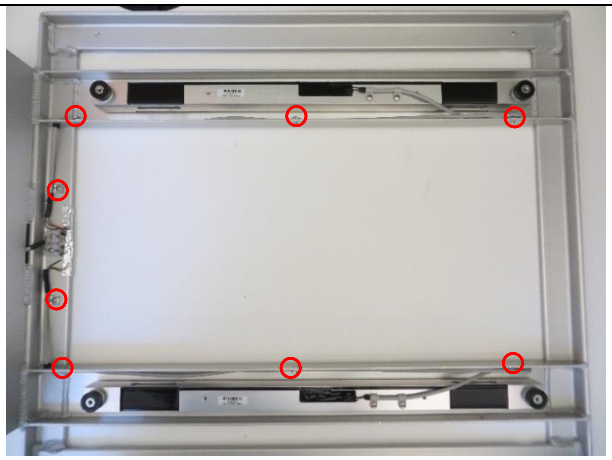
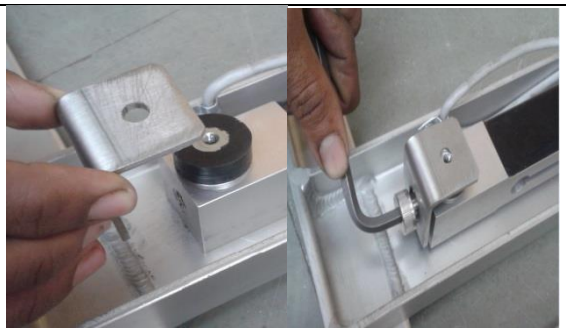
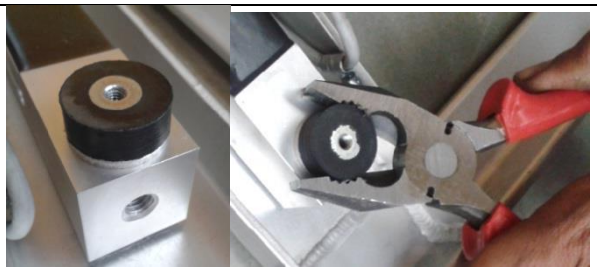
6. Use a 5/32” Allen wrench to remove the four screws on the bottom pan and the bottom pan can be removed	
7. Use a ½” wrench to remove the nuts on the wheel’s screw. Remove the wheel	

8. Use a ½” wrench to remove the remaining nuts on the wheel bracket	
9. Use a 1/8” Allen wrench to remove the feet’s screw	

6702, 6702SP, 6702W Base Disassembly

** Purchase the load cell upgrade kit

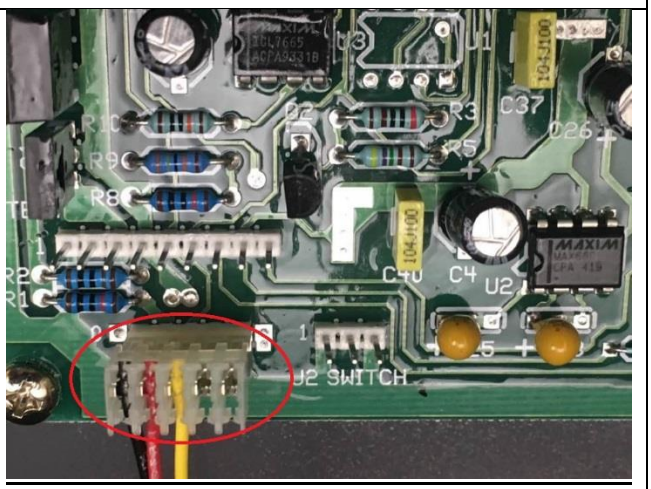
1. Using a 1/8” Allen key, remove the four corner screws on the top cover	
2. Remove and discard aluminum tape over the load cell wires that enter the terminal block.	
3. Unscrew the four front terminal block screws half the way using 5/32” Flat head screw driver, pull out the front wires, and unwind the wires.	

4. Remove and discard the aluminum tape over the load cell wire	
5. Remove the eight wire clips along with the screws and nuts fastening them. Also, remove the load cell wires from the grommets and the two grommets mounted on the C channel near mast. *Make sure that no screws, nuts, or wire clips remain in the C channel.*	
6. Use the Allen key to remove one, BRACKET and one SHLDR SCW from the end. Repeat for the remaining three brackets.	
7. Remove the four (4) LOADMOUNT from LOAD CELL	
8. Tilt the frame 90 degrees and hold the load cell. Remove the eight (8) screws that hold the load cells using 7/16" wrench to remove the Load beam.	

Remove the two load cells, along with the attached load mounts, washers and spacers supporting them. *Make sure to hold the load cell from the opposite side while removing the screws to keep them from falling.*	
9. Remove the four outriggers for 6702SP.	
10. 6702W Remove the two (2) extender feet & four (4) plastic feet. The 6702 doesn't have the extender feet but will have the plastic feet.	

5122 Disassembling

5122 with AC Power Option:

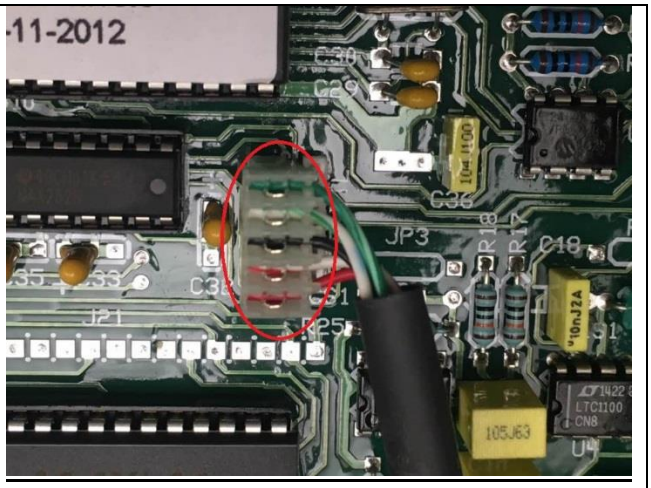
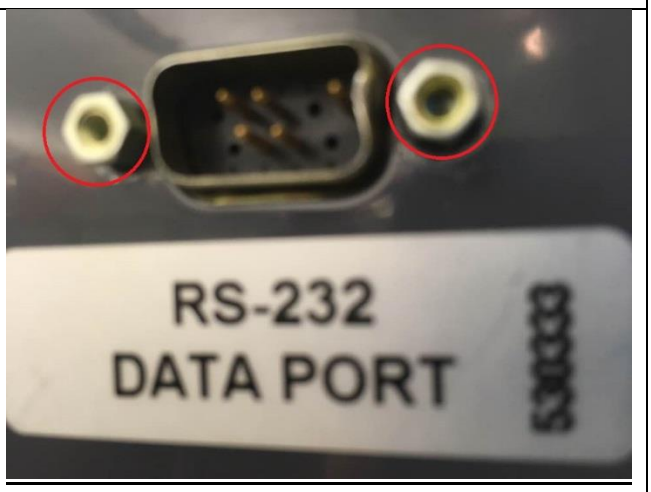
1. 5122 AC Power Disassembly: Use a 1/8” Allen wrench to remove the 8 screws on the back of the mast	
2. Remove the handle	
3. Disconnect J1	

4. Use a 10 mm nut driver to remove the AC power jack	

5122 with Battery Option:

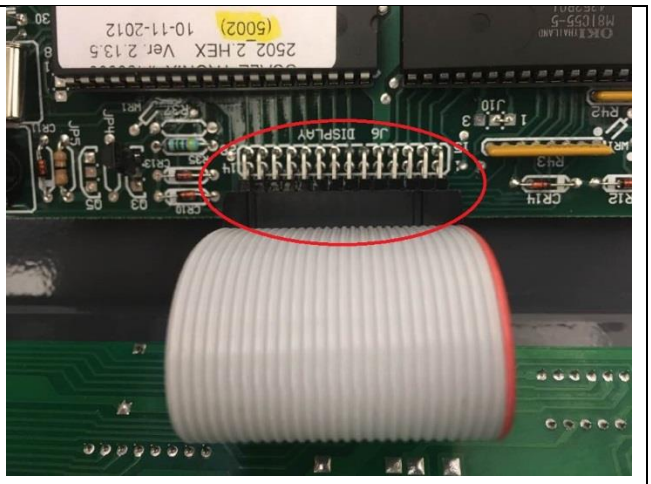
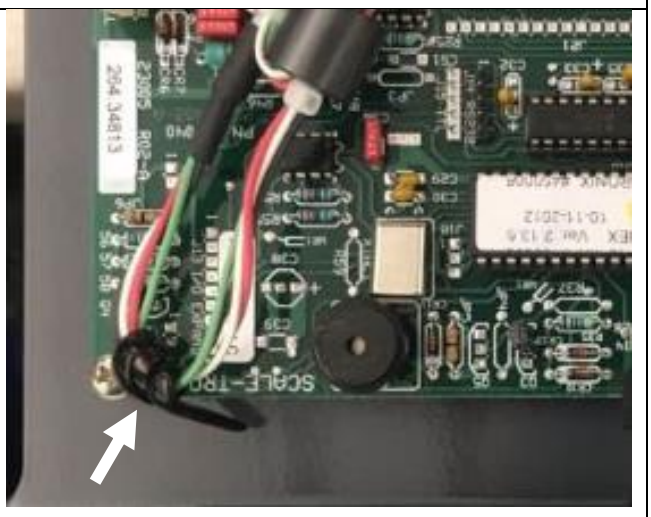
1. 5122 Battery Disassembly: Use a #1 Phillip screwdriver to remove the two screws to remove the two screws on the battery access door	
2. Remove batteries	
3. Use a small screwdriver to remove the screws on the battery holder mount (J1 wire that connects the battery holder to the board was already disconnected in the section above)	

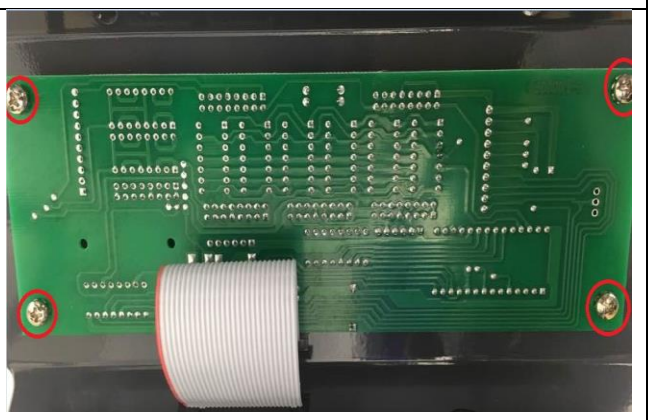
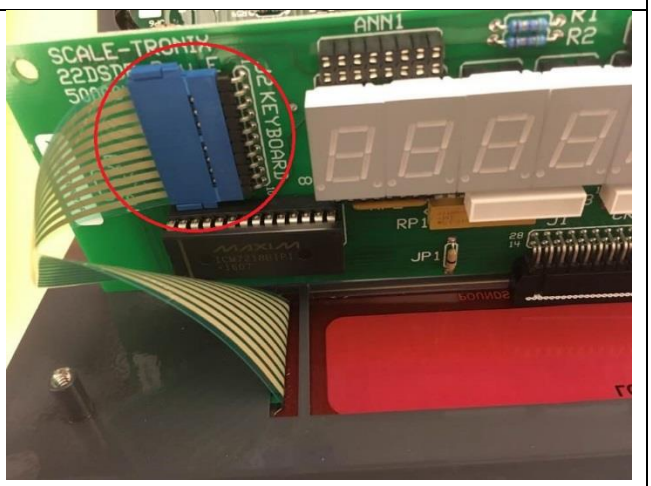
5122 with RS232 Option:

1. 5122 RS232 Port Disassembly: Disconnect J14	
2. Use a 5 mm nut-driver to remove the two nuts	

5122 Readout Disassembly:

1. 5122 Readout Disassembly: Use a 1/8” Allen wrench to remove the two screws on the readout panel cover. Remove the cover by lifting it up to reveal the readout board	

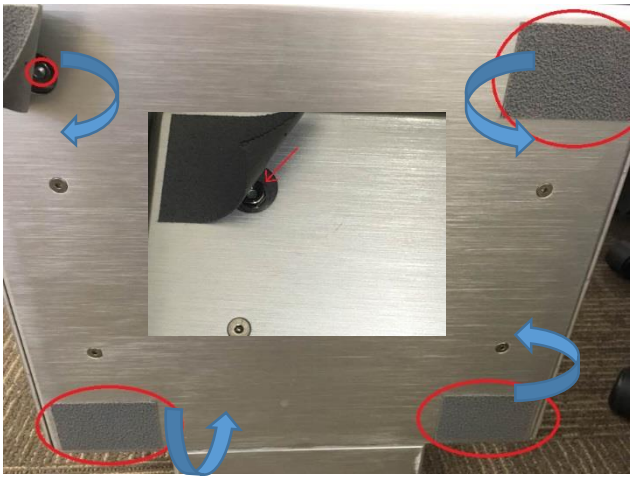
2. Disconnect J6	
3. Disconnect J4	
4. Lift the black clamp to remove J4	

5. Use a #1 Phillip screwdriver to remove the screws on each corner of the board	
6. To remove the switch assembly, use a #1 Phillip screwdriver to remove the four screws	
7. Unplug the blue-ribbon cable	

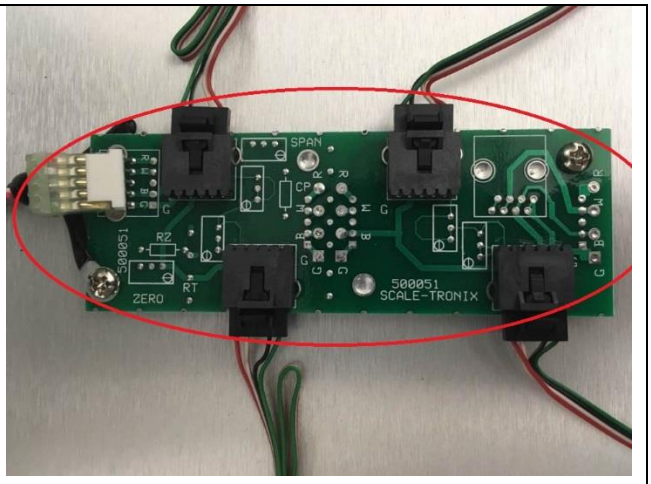
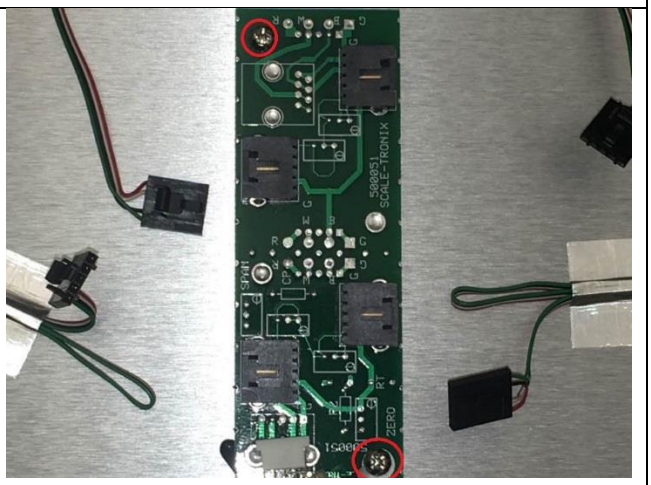
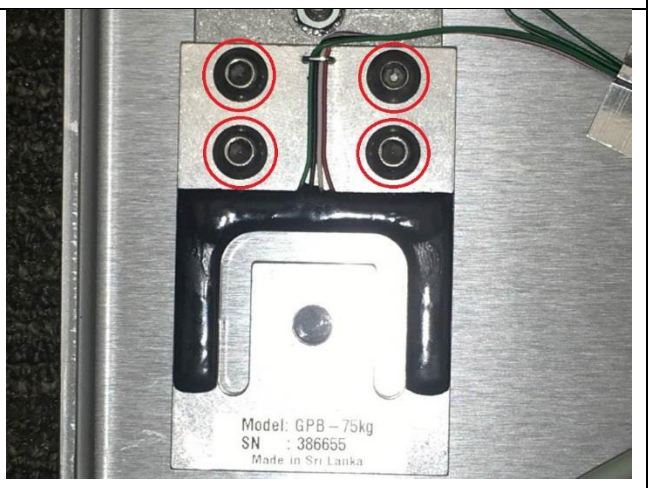
5122 Mast Removal:

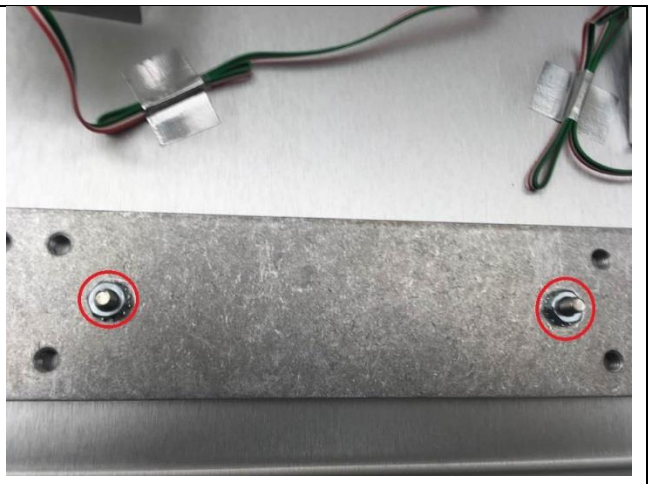
1. Use a 1/8” Allen wrench to remove the two bottom screws on each side of the mast to remove the mast (J4 wire that connects the mast to the base was already disconnected in the section above)	

5122 Top Plate Removal

1. **5122 Top Plate Removal** Peel the shurstep material back halfway to access the slider deck’s four nuts. Use a 11 mm socket to separate from the base assembly	

5122 Base Disassembly

1. 5122 Base Disassembly Disconnect the wire harnesses	
2. Use a #1 Phillip screwdriver to remove the two screws on the junction board	
3. Use a 5/32” Allen wrench to remove the four screws on each load cell <u>NOTE:</u> Remove the tape or cable clamps that hold the load cell and the cable in place to the weldment	

4. Use a 10 mm socket to remove the two nuts on each of the spacer	

Troubleshooting

Scale Troubleshooting

The internal microcomputer contained in the readout constantly monitors the scale's operation and uses the display to indicate error conditions when they arise. An explanation of these messages is given below:

a. "**bAttrY**": Indicates the battery has become depleted to the point that it can no longer operate the scale. Replace the battery to continue operation.
b. "**O-LOAd**": Shows that the scale platform's weighing capacity has been exceeded. Refer to the inside front cover specifications for maximum capacity.
c. "**CAbLE**": Displays that the transducer signal is well in excess of its maximum value. This is usually caused by the transducer cable being disconnected. Check the cable connection between the readout and the weighing platform. On scales with a mast (**5002, 6002**, etc.) check the connection at the base of the mast.
d. "**OFF SCALE, PLEASE –**": Ramp equipped scales (**6002, 6702**, etc.) require that a "zero" value be established before the patient enters the weighing platform area. Remove the patient from the weighing platform and allow the scale to obtain "zero".
e. "**E-FAIL**", "**r-FAIL**": Shows that a memory failure has occurred in the internal microcomputer's memory. Requires service of the scale.

The following simplified trouble shooting procedures are recommended for identifying defective system components. Certain corrective measures are provided. More complicated servicing should only be performed by the factory or authorized service facilities. Most problems can be solved over the telephone. Problems requiring factory service are usually handled quickly and the scale is on its way back. Call first to discuss the problem.

WEIGHT READING NOT ACCURATE

This can commonly be caused by a mechanical obstruction of the weighing platform. Check that the platform is not touching some foreign object so that it is restricted in its' downward movement. Also check that the connecting cable is firmly plugged into the instrument circuit board (marked "J4 LOAD CELL"). On those scales with masts check the mast cable for a firm connection to the base.

WEIGHT READING TAKES EXCESSIVE TIME TO DISPLAY

If the platform is in motion, the scale will wait for it to settle before displaying the weight. This can be caused by excessive patient motion.

Also check that the connecting cable is firmly plugged into the readout cabinet. Examine the weighing platform that it is not rubbing against a foreign object.

SCALE DISPLAYS "CAbLE" OR "O-LOAd"

This indicates the scale's internal microcomputer has received a signal in excess of its expected value. "**O-LOAd**" indicates the weight signal is larger than the maximum value assigned to that particular model (see specifications on inside front cover). If the weight value is within the specified range, this indicates a damaged transducer or defective instrument board.

The "**CAbLE**" display indicates a signal outside the range of the internal a-d converter has been applied. This is most likely caused by a damaged or disconnected transducer cable. On those scales with a mast, check the connection to the weighing platform at its base. Also check the internal connection of the four wire cable to the "J1 LOAD CELL" connector.

READING DOES NOT CHANGE WHEN WEIGHT APPLIED

Check that the weight platform is plugged into the readout. The platform cable, connector or load cell transducer may be defective. The load cell transducer's resistance can be checked with an ohmmeter after unplugging from the readout. The proper resistance values are listed below:

SCALES (5002, 5702, 6002):

WIRE COLORS (PIN NO.)	**RESISTANCE**
GRN(1)/BLK(2)/WHT(3)/RED(4)	>10MΩ
GRN(1) TO BLK(2)	270-290Ω
WHT(3) TO RED(4)	250-251Ω

Consult Welch Allyn if readings differ from those shown.

NOTE: Ohmmeters will not indicate a change in resistance of the load cell transducer when weights are applied to scale. This is due to the extremely small change in resistance of the strain gauges employed (<1 ohm) and the fact that the bridge configuration presents a constant value of resistance when measured from its terminals.

NON-FUNCTIONING KEYS(S)

Check the front panel keyboard for visible signs of damage (punctures, dents, etc.). Check that keyboard tail with connector is properly inserted into the display board.
If a particular function does not work (example" no kilogram units) check if that particular function is turned off in the "**SET-UP**" mode.

ERROR MESSAGE DISPLAYED: "E-FAIL" OR "r-FAIL"

This indicates a failure of the internal microcomputer's memory during the start-up self-test. "**E-FAIL**" indicates a failure of the microcomputer's EPROM memory during the checksum test. "**r-FAIL**" shows a failure of the random access memory. Both conditions require replacement of the microcomputer.

Printer Troubleshooting

The following simplified trouble shooting procedures are recommended for identifying defective system components. Certain corrective measures are provided.

NO PRINT, FOUR SHORT BEEPS

This indicates a print request was made when a valid weight is not present. The patient's weight must be currently displayed on the scale's readout before the printer will function, or alternately, the "**PRIOR WEIGHT**" can be printed if the "**PRINT**" button is pressed immediately after pressing the "**RECALL**" button.

A second reason for this problem is if the print button is pressed while a ticket is currently printing. If this occurs simply wait for the current ticket to complete printing before requesting another by pressing the "**PRINT**" button.

NO PRINT, ONE LONG BEEP

This indicates the printer did not respond to the scale's request for printing. This can be caused by the printer being out of paper or the printer head switch being in the "UP" (open) position.

Observe the printer status lamp, LED D202, on the printer interface board; it should light immediately when the print button is pressed. If the lamp flashes "red" Check that the printer interface board has all cables connected and that the data cable is connected to the scale's data port connector.

PRINTER RUNS BUT RESULT IS BLANK OR FAINT

This is generally indicative of a problem with the paper used for printing. This printer uses "thermal" type printing paper; using ordinary plain paper will not produce a printed result. Also, note that since thermal printing paper is coated on one side only, inserting the paper upside-down will result in a blank weight ticket.

There are differences between the sensitivities of various thermal type papers, which can result in variations of print contrast.

PRINTED RESULT DISTORTED, PAPER ADVANCE NOT WORKING PROPERLY, EDGE OF PAPER TICKET WRINKLED OR TORN

Compressed printing may be caused by the paper not advancing properly. Press the paper advance switch and check that the paper feeds smoothly. Inspect the printer mechanism and look for small bits of paper or other debris on the paper drive roller. Check that nothing is interfering with the movement of the paper or paper roll. Check that the paper roll is the correct maximum diameter of 1 7/8" (about 47mm).
If problems are noted with the paper advance or if the edge of the weight ticket is wrinkled or torn, examine the paper for correct loading. Check that the paper roll is properly installed and is not dragging or rubbing due to interference.

SECTION OF PRINT OUT MISSING

If a small section of printed output is missing, activate the print head lever, remove the paper, and look at the print head for small bits of loose paper or other debris. Blow gently in the print head to dislodge any foreign matter. If the problem continues it may indicate a defective thermal print head. If a large continuous section of the printed output is missing, it likely indicates a problem with one of the strobe (STB) signals between the printer and

interface board. This can be caused by a defective thermal print head, printer head cable, or interface board. The appropriate STB line can be identified as follows:

STB1: Controls left 1/3 printed area
STB2 & STB3: Controls center 1/3 printed area
STB4: Controls right 1/3 printed area

LOW BATTERY LIGHT FLASHES DURING PRINTING

This is caused by a battery that is becoming weak. The large amount of power demanded by the printer taxes the battery more than regular weighing use of the scale. Some occasional flashing while printing is acceptable. Replace battery when possible.

PRINTER STATUS LIGHT FLASHES RED

The printer status lamp will change color from green to red if a problem is detected. It will also flash a predetermined number of times to indicate the cause of the malfunction. The flashing sequence is described below:

One flash: Needs paper. If paper is ok, then check connector J207.

Two flashes: Printer head is open. Close printer head. If problem continues check cable at J208. Check the printer head switch.

Three flashes: Indicates head temperature is outside of acceptable range. Check head cables J203 & J204. Check thermistor resistance; it should measure approximately 30k ohms at room temperature.

Four flashes: Indicates interface board has internal problems with its microcontroller. Replace interface board.

PRINTED PAPER TICKET TEARS POORLY, UNEVENLY

Inspect the tear bar mounted in the enclosure top cover for signs of damage (missing teeth, cracks, missing fasteners, etc.).

NO PRINT, FOUR LONG BEEPS

This is a signal to signify a problem with the printer. It is produced when the printer is not ready to accept data from the scale. This usually indicates a defective printer mechanism or interface board, or a print head which is mechanically stuck and cannot return to the “home” (left most) position. Check that the printer head assembly can move freely on its carriage. Check for jammed paper in the printer mechanism.

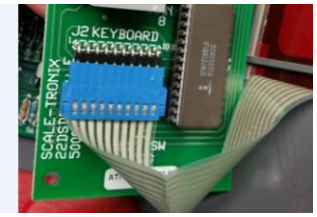
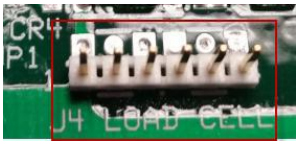
Also check for disconnected cables between the scale’s instrument board, the printer interface board, the printer controller board and the printer. Note that the flex circuit from the mechanical printer assembly must be correctly inserted in the connector marked “CNA” on the printer interface board. Observe LED201 on the printer controller board, it should light immediately when the print button is pressed.

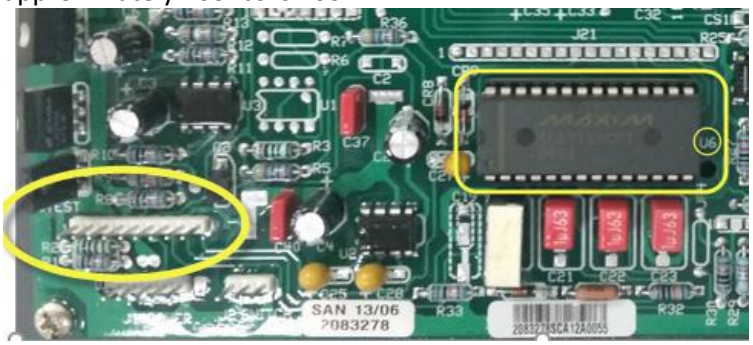
PRINT RESULT DISTORTED, MISSING DOT(S)

This can be caused by a defect in either the printer’s head assembly or the printer interface board. Check the print head resistors with an ohmmeter. They should measure approximately 15-20 ohms when measured at the flexible circuit from the printer and should all be approximately the same resistance. (Pins 1-8 that mates at connector “CNA” of the printer interface board, resistor common is pins 9/10/11.) If the print head resistor checks ok, the problem may be in the printer interface board.

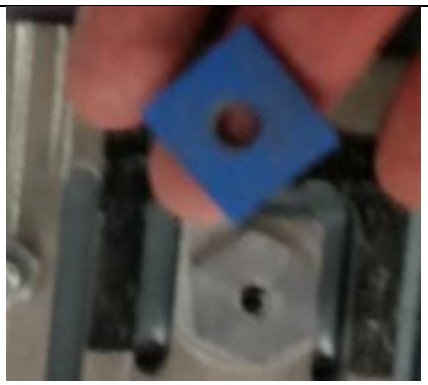
Symptoms and solutions

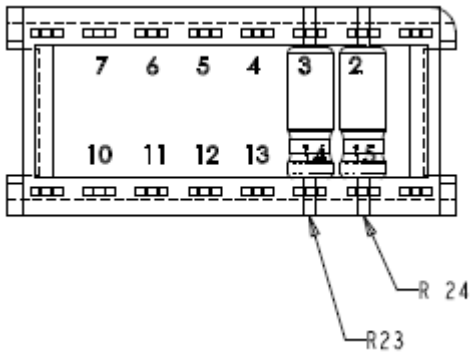
Symptom	Possible Cause	Corrective Action
Scale does not turn on	Dead Batteries "D" Cell no rear Adapter	Remove the rear cover using a Phillip head screwdriver. Replace the "D" cell batteries.
	Wrong Battery Voltage	Check the voltage of the rechargeable battery. Scales with grey mast requires 7.2 volts.
	Damaged AC Adapter	Use a voltmeter or a multimeter to check continuity of the adapter. Replace if needed.
	Cracked Battery Holder	Replace the Battery Holder Assembly. **Note** Black and White Wire that was unhooked from the faceplate pulls out with the Battery Holder & Bracket Assembly
No Power/No Display	Display Cable	Check the pins in the cable to make sure the Display cable is properly aligned and seated
No Display	Display Board/Mainboard	1. Main Board Check the U6, U7, and U10, IC Chips to make sure they are fully seated in IC Sockets. 2. Test for +5 Volts across pins 1 and 8 of JTest connector, for VR1, after pressing the "On" button. 3. Test for +5 volts on VR2 Regulator Pin 3 for the Voltage to Microprocessor and the Display board, if no + 5 Volts, replace regulators, VR1, or VR2. 4. Check U10 chip across pins 20 to Pin 18 (2.31V), across Pin 20 to Pin 19 (2.33V) +/ – 0.1 Volts 5. Check the crystal chip to ensure it is operational and functional. If one of the pins is at 0 or 5 volts, then the scale will not turn on. Replace the Board if necessary.
Faint Low Battery Light	Crystal	1. Check U10 chip across pins 20 to Pin 18 (2.31V), across Pin 20 to Pin 19 (2.33V) +/ – 0.1 Volts.

		2. Check the crystal chip to ensure it is operational and functional. If one of the pins is at 0 or 5 volts, then the scale will not turn on. Replace the Board if necessary.
Scale turns on for a moment then shuts off	Front Panel Switch Assembly	Visually inspect the front panel, to determine if any switches are indented concaved, nicked, battered, beat up, poked, jabbed, bruised, crushed or cracked. If so replace the front panel switch assembly. If the switch assembly looks good press on the U6, U7 and U10 IC chips to make sure they are fully seated. **Test switch assembly.** Unplug the switch connector from J2 on the Display board and short pins 1 and 10 together for one second to turn scale on  If Scale turns on replace the switch assembly. Follow the below instructions to replace the switch assembly. 1. Remove front panel switch assembly, there are two Screws on top of front panel with 1/8” Allen Key. 2. Check to make sure the Black and Red battery cable is connected to J1 Power. Unhook J1 Power from the main board. 3. Unplug the J4 Load Cell Connectors from the Main Board.  4. Remove 4 Philips head screws to pull back the display board and remove the blue ribbon cable from J2 of Display.

		5. Peel off the front panel switch assembly from the front side of the faceplate
No Weight Change Scale Only Reads "0.0"	Cable Assembly	**Test Cable:** 1. Remove front panel and unplug the J4 Load Cell Connector 2. Turn scale on IF Scale displays **"Cable"** or **"O-Load"** Replace the MAST Cable **IF** Scale display remains at **"0.0"** 1. Test with DC Volt Meter across pins 1 and pin 7 of JTest • Voltage .985 or +/- .01 and stable 2. Test mV reading from **Pin 1** of **JTEST** to pin 10 of U6 approximately 100 lbs is 100 mV 
	C21, C22 & U6 on the Main Board	IF the above test of pins 1 and pin 7 have the 100 mv reading then the components to check are C21, C22 and U6. Replace C21, C22 and U6 or Replace the main board
Rotating or Loose Transport Mast, Top Handle	Washer with Liner Pin	Remove front panel Tighten with a 7/16" Ratchet/Wrench. If they will not tighten, replace the washer and liner pin.
Cracked Base, broken, loose	Metal Frame - around the weld edges	Replace the Base
Mast is loose	Loose Bolts	Tighten the bolts as tight as you can get them

Inaccurate Weight Readings with the 4 Corner Test being stable and consistent	Mechanical Hang-up on Platform Assembly	1. Inspect the 4 nylon feet – if missing or damaged replace Delron feet Must order the screws 130060 with the feet 5002 use Delron Foot # 139041 5702 & 6002 use Delron Foot # 139040 2. Tip and shake the scale gently see if something got lodged in the edge 3. Take screw driver around the edge to dislodge any debris **4 corner platform test using 25KG or 50lb certified weight** 1. Apply weight evenly on the center of the scale. Press "**REWEIGH**" two times and record your weight reading each time. 2. Remove weight from center and apply weight on each 4 corners one at a time and Press "**REWEIGH**" two times and record weight reading each time. **Examine your corner readings** Plot all readings and they should be within +/ - 0.4 lb./.2 kg from center reading.
Inaccurate Weight Readings with the 4 Corner Test "Not" stable	Blue EAR missing on Load mount	**IF** your corner readings are more than +/- 2 lb/1 kg away from center reading. The corner that reads the lowest is the problem area. Repeat corner test if need be. Follow troubleshooting procedures to the **platform.** 1. Remove the hand rail 2. Remove Grey Dust Cover - held on with Double Sided Tape 3. Remove the top plate held on by 4 button head screws. If one of the screws is damaged or missing replace it. 4. Inspect scale for debris or foreign objects. 5. Inspect the 4 Load mounts and ensure the blue ears are properly in place, if missing or out of position replace blue ear.

		 6. To reinstall button head screw's, apply some removable Loctite 220 to each screw. Avoid over tightening the screws. Turn screw all the way down and then turn screw back 1/4 turn.
	Bad Load Cell	Removing the top plate, the load cells will be visible 1. Enter into **"Cal Mode**" from the front panel 2. Press and hold the Reweigh button 3. Turn the Scale on 4. Release the Reweigh button immediately 5. Immediately go to the **ST l**ogo and press 5 X 6. Display should say "**CAL**" 7. Press **ST** Logo two more times to display A/D Readings Note: A/D reading without a load. Look for a low stable weight reading less than 10 lbs and that is not drifting or unstable. Unplug each load cell and connect one at a time to see if your display becomes unstable. This will tell you which load cell needs to be replaced
	Cal Chip	Check Gain Resistor R24 on the Cal Chip, Replace Cal chip if necessary.

<table>
<tr><td></td><td></td><td> 

<table>
<tr><th>ASSEMBLY MATERIAL</th><th>LOCATION</th><th>RESISTOR VALUE</th></tr>
<tr><td>255006</td><td>R24</td><td>23.7K 1% 1/8W</td></tr>
<tr><td>255008</td><td>R24</td><td>68.1K 1% 1/8W</td></tr>
</table></td></tr>
<tr><td>Only displays Scale Model #</td><td>Bad A/D Chip</td><td>U10 Microprocessor not communicating U6

Check to make sure the U6 and U10 chips are seated all the way. Replace the Main Board if necessary.</td></tr>
<tr><td>----------</td><td>A/D Readings are unstable</td><td>Removing the top plate, the load cells will be visible

1. Enter into “Cal Mode” from the front panel
2. Press and hold the Reweigh button
3. Turn the Scale on
4. Release the Reweigh button immediately
5. Immediately go to the ST logo and press 5 X
6. Display should say “CAL”
7. Press ST Logo two more times to display A/D Readings

Note: A/D reading without a load. Look for a low stable weight reading less than 10 lbs and that is not drifting or unstable.

Unplug each load cell and connect one at a time to see if your display becomes unstable. This will tell you which load cell needs to be replaced</td></tr>
<tr><td></td><td>Load Cell/Calibration</td><td>(OHM out Load Cells) See Calibration procedure this Service Manual</td></tr>
<tr><td>Weight Remains the same</td><td>Memory Chip or Microprocessor</td><td>U9 and EM1033 or Microprocessor – Replace the Main Board</td></tr>
<tr><td>Unable to Calibrate</td><td>Cold Solder on the Calibration Plug</td><td>Check Gain Resistor R24 on the Cal Chip, Replace Cal chip if necessary.</td></tr>
</table>

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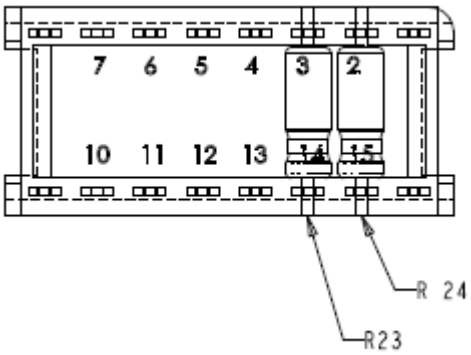

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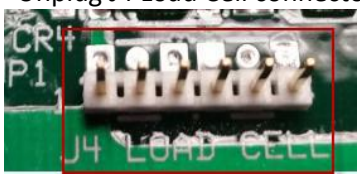
</table>
</td></tr>
<tr><td>Display says "Cable or O-Load" Flashes or Beeps</td><td>Mast Cable/Platform</td><td>
Try to Zero first:

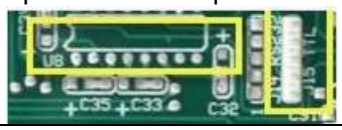
Remove Front Panel - Top of Faceplate (need 1/8” Allen key)
Check the green, white, black and red cable to make sure that it is connected to the J4 Load Cell 6 pin connector
Gently press all the chips on the Display board to make sure they are seated

Test Electronics

Unplug J4 Load Cell connector


Short the two center pins 3 and 4
IF the electronic display goes to 0.0 this verifies that the electronics are working as expected. The problem is external. Check the continuity of the cable. IF cable is open replace cable.
Ohm out pins 1 and 6 of J4 connector. The reading should be approximately 270 – 290 Ohm to be stable. If outside of this range test the Load cells and replace as necessary.
Ohm out pins 3 and 4. The reading should be approximately 250 Ohm’s. If outside of this range test the Load cells and replace as necessary.

</td></tr>
</table>

Letters or Numbers across the Display	IC Chips may be loose	U1 on the Display Board – Reseat the IC chip (U1) on display or replace Display board
All the numbers are not lighting up (Missing Segments of the Numbers)	LED	**Remove the Display Board** (see directions above) 1. Gently, lift a working 7 Segment LED chip with a flat head screw driver and exchange with a non-working LED chip. 2. IF the trouble follows the LED chip replace the chip 3. IF the trouble stays in the socket replace the display board.
Beeping and Buzzing	Bad Chip	Check U7 Chip seating or replace the Main Board
Paper Jam	Paper being torn off incorrectly	Must lift paper straight down or up at a slight angle, and do not pull out or to left or right side of paper slot (opening in door for paper).
Not printing, Paper not coming out of printer	Too much paper is curled up inside on roller	Have to remove paper from roller and redress paper in roller of printer mechanism.
	Installation of thermal paper	Paper may be installed upside down. Thermal paper is critical to the operation, and needs to have the chemical treated side of paper facing print head.
Pink strip on paper	Almost out of paper	Time to change the thermal paper
Not operating four long beeps	Yellow Data Cable	Open Front Panel, Locate Yellow Data Cable from side of printer to Main PCB J15 TTL port. Check the cable connection to J15, 5pin header to make sure it is correctly plugged into the J15 port. Red wire w/ white strip should be on Pin 1 of J15 TTL port (5 pin connector on the main board), and green wire with white stripe should be on pin 5 of J15 TTL port. 
	U8 RS232 Chip	If U8 has the RS232 chip in socket, then remove the U8 IC Chip from IC socket for printer to operate.
Not operating	Weight on Display & No Print	**Note:** Printer will not print 0.0 lb/kg weight reading. When the "Print" button is depressed do you hear a beep or see a Data lamp light up on Display for a moment? If no, printer is shut off and needs to be activated in "Set-Up" mode, see manual. If yes, open printer door and view printer status light. See Printer section in the service manual.

One Flash	No Paper	Add/Install Thermal Paper.
Two Flashes	Print Lever not down	Close the print Lever. Unit will not operate with lever up.
Three Flashes	Printer head temperature is out of operational range	Check cables J203, J204 from Printer PC Board to printer mechanism.
Four Flashes	Indicates printer PCB has trouble	Replace Printer PC Controller Board, which has failed.
Print is faint	Low Batteries	Replace batteries
	Printer Mechanism	Replace Printer Mechanism

Repair Parts List

5002/5702/6002 Base Components

030298W	BTM PAN, 5002 GPR	620003	DUST COVER GRAY
50215	PLATE, TOP 5002	630209	ASSY GPR BOTTOM PAN
030352W	Plate, 6002 GPR Top	630210	ASSY 5002 GPR
50314	BUSHING, WHEEL 5/16" X 1"	630221	ASSY GPR 6002 6502 5702
50502	WHEEL 4"	750092	CABLE GPR OUTPUT
50509	1/8 THICK EAR SPACER 3/4" X 3/4"	020003W	HINGE PIANO 6002 RAMP
50518	WASHER, 0.281" X 1.000" X 0.125"	030019W	RAMP 6002
50614	SCW, 5-16-24 X 1 3/4" HEX CS GRD 8,	030208W	DECK PLATFORM BASE 5702
		039283W	BASE WELDMENT, 6002/6502
52523	NUT, 5/16-24 HEX NKL	039300W	PLATFORM DECK, 6002 SN>4000
133086	LOADMOUNT 3/8" X 1" WITH 3/8"	039324W	BASE, 5002 S/N 5000+
133110	MOUNT METAL LOAD	090065W	KIT, BARI-SCALE, HW/INST
139040	FOOT PLASTIC I 3/4" X 3/8"	20067W	LOAD CELL DEBB II
139041	WASHER FLAT NYLON 1 1/4" X 1/4"	22P827	WASHER
400039	LOAD BEAM WING BACK 135LB	700125W	PCB ASSY TERMINAL JUNCTION BD
531011	SHUR-STEP GRAY 12" X 9 3/4" (2 PCS)	AP-113	TERMINAL BLOCK
		630227	ASSY, EXTERNAL AC POWER SUPPLY HARNESS
531012	SHUR-STEP MAT·12" X 11 3/4" (2 PCS)		

6702/6702W/6702SP Base Components

Note: All 6702/6702W/6702SP scales are required to upgrade to the new Loadcell and Calibration plug listed below.
If your current scale has the older loadcells please purchase the upgrade kit listed below.

6702/6702W Base Components

106912	6702/6702W LOAD CELL UPGRADE KIT	48611	SCW, 6-32 X 1/4" PHMS SEMS, NICKEL
727175	DEBB 1000LB LOAD CELL	48113	SCW, 6-32 X 3/8" PHIL PAN HD NICKEL
900001W	BRACKET, ISOLATION LIMITER	106137-7	NUT 6-32 LOCKING HEX
726341	SHOULDER SCREW 1/2" OD X 1/4" L	130060	SCREW 10-32 X 1/2" FHS FOR DELRON
133086	LOADMOUNT 3/8" X 1" WITH 3/8"	30378	10-24 X 1/2 FH SOC SCR
726348	WASHER,1/4" ID X 1"OD X 0.060"-0.090"TH	412152	CALIBRATION PLUG 6702 SCALE-T
727292	LOAD CELL SPACER 4HOLE SCALE-T	130212	10-32 X 1/4 SCREW - BHMS SOC
727547	SCREW, 1/4-20 X 1.75 HHCS SS	412884	6702 FOOT WASHER/SCREW KIT
727578	1/4 SPLIT RING LOCKWASHER, SS	139040	FOOT PLASTIC I 3/4" X 3/8"
727711	CLIP, 6702W BASE EXTENDER	726340	WSHR 0.281" ID, 1.5" OD, 0.11"- 0.14 THK
412873	1/4-20 X 1 IN SET SCREW	CS-206	WASHER, FENDER .28" X 1.5"
726461	NUT, 1/4-20 SER FLNG, GR5 ZINC SCALE-T	10624	SCREW 1/4-20 X 1" FHSS
20008	GROMMET HEYCO SB375-4 (2030)	039304W	BASE WELDMENT, 6702
50542	CLIP, METAL CABLE 3/16"	039314W	TOP, SCALE 6702

039325W	CABLE GUARD
AP-113	TERMINAL BLOCK
20687	SCW, 6-32 X 3/4" PHIL PAN, SS
50614	SCW, 5-16-24 X 1 3/4" HEX CS GRD 8, NICK
106100-4	SCREW, 4-40 x .380 PHP
52523	NUT, 5/16-24 HEX NKL
48143	WASHER, #5 X 0.312 X 0.062" NYLON
50314	BUSHING, WHEEL 5/16" X 1"
66033W	CLAMP, CABLE 1/8" METAL
50502	WHEEL 4"
630180	CABLE ASSEMBLY 9" 6702 EXTENS
039312W	PLATFORM RAMP 29" 6702
039319W	DECK, OVERSIZE 30" X 35"
039343W	PLATFORM, EXT LENGTH 6702
039344W	RAMP, EXT LENGTH 6702
029073W	PLATFORM HINGE 29" 6702
531012	SHUR-STEP MAT·12" X 11 3/4" (2 PCS)

6702SP Base Components

106913	6702SP LOAD CELL UPGRADE KIT
727175	DEBB 1000LB LOAD CELL
900001W	BRACKET, ISOLATION LIMITER
726341	SHOULDER SCREW 1/2" OD X 1/4" L
133086	LOADMOUNT 3/8" X 1" WITH 3/8"
726348	WASHER,1/4" ID X 1"OD X 0.060"-0.090"TH
727292	LOAD CELL SPACER 4HOLE SCALE-T
727547	SCREW, 1/4-20 X 1.75 HHCS SS
20008	GROMMET HEYCO SB375-4 (2030)
50542	CLIP, METAL CABLE 3/16"
48611	SCW, 6-32 X 1/4" PHMS SEMS, NICKEL
48113	SCW, 6-32 X 3/8" PHIL PAN HD NICKEL
106137-7	NUT 6-32 LOCKING HEX
130060	SCREW 10-32 X 1/2" FHS FOR DELRON
30378	10-24 X 1/2 FH SOC SCR
412152	CALIBRATION PLUG 6702 SCALE-T
130212	10-32 X 1/4 SCREW - BHMS SOC
727578	1/4 SPLIT RING LOCKWASHER, SS
412249	6702 OUTRIGGER FEET ASSEMBLY
726253	BRACKET, 6702-SP STABILIZER SCALE-T
700000W	L-ANGLE SUPPORT ASSY, 6702SP
139040	FOOT PLASTIC I 3/4" X 3/8"
60624	SCREW 1/4-20 X 1" FHSS
50529	1/4-20 X 3/4 BUTT HD SOCK SCR
726461	NUT, 1/4-20 SER FLNG, GR5 ZINC SCALE-T
726773	SCW 5/16-18 1/2" ROUNDED CAP, VIBRATITE
CS-206	WASHER, FENDER .28" X 1.5"
726340	WSHR 0.281" ID, 1.5" OD, 0.11"- 0.14 THK
039304W	BASE WELDMENT, 6702
039314W	TOP, SCALE 6702
039325W	CABLE GUARD
AP-113	TERMINAL BLOCK
20687	SCW, 6-32 X 3/4" PHIL PAN, SS
50614	SCW, 5-16-24 X 1 3/4" HEX CS GRD 8, NICK
106100-4	SCREW, 4-40 x .380 PHP
52523	NUT, 5/16-24 HEX NKL
48143	WASHER, #5 X 0.312 X 0.062" NYLON
50314	BUSHING, WHEEL 5/16" X 1"
66033W	CLAMP, CABLE 1/8" METAL
50502	WHEEL 4"
630180	CABLE ASSEMBLY 9" 6702 EXTENS
090075W	SRV KIT STABILIZATION 6702SP
039312W	PLATFORM RAMP 29" 6702
039319W	DECK, OVERSIZE 30" X 35"
039343W	PLATFORM, EXT LENGTH 6702
039344W	RAMP, EXT LENGTH 6702
029073W	PLATFORM HINGE 29" 6702
531012	SHUR-STEP MAT·12" X 11 3/4" (2 PCS)

5122 Scale Components

400038	LOAD BEAM 75KG THRU HOLE 11"	750075	CABLE INTERNAL MAST 5122
720024	FACE PLATE SWITCH ASSY, RS-232 GRAY SCAL	700116	MAIN INSTRUMENT BOARD (No Cal Plug & Firmware Chip)
720025	SWITCH ASSY KG ONLY	133096	LOAD MOUNT, 3/8" W/ 1/4-20 ½
750068	CABLE, 4" RIBBON 2 X 14	531016	SHUR-STEP GRAY 2" X 3"
700027W	PCB, DISPLAY ASSEMBLY	531021	SHUR STEP GRAY 12" X 14" 5122
450006-KIT	FIRMWARE 5122 V2.13.5	341004	12VDC POWER SUPPLY W/CONNECTOR
255019	CALIBRATION PLUG 5122		
710031W	HARNESS, RS-232 DATA	412372	ASSY 700116 MAIN PCBA FOR 5122, STD
630037	BATT/HLDR-AC JACK BRACKET		
700076	"D" CELL BATTERY	412373	ASSY 700116 MAIN PCBA FOR 5122, KG
620000	PANEL, BATTERY/ACCESS GRAY		

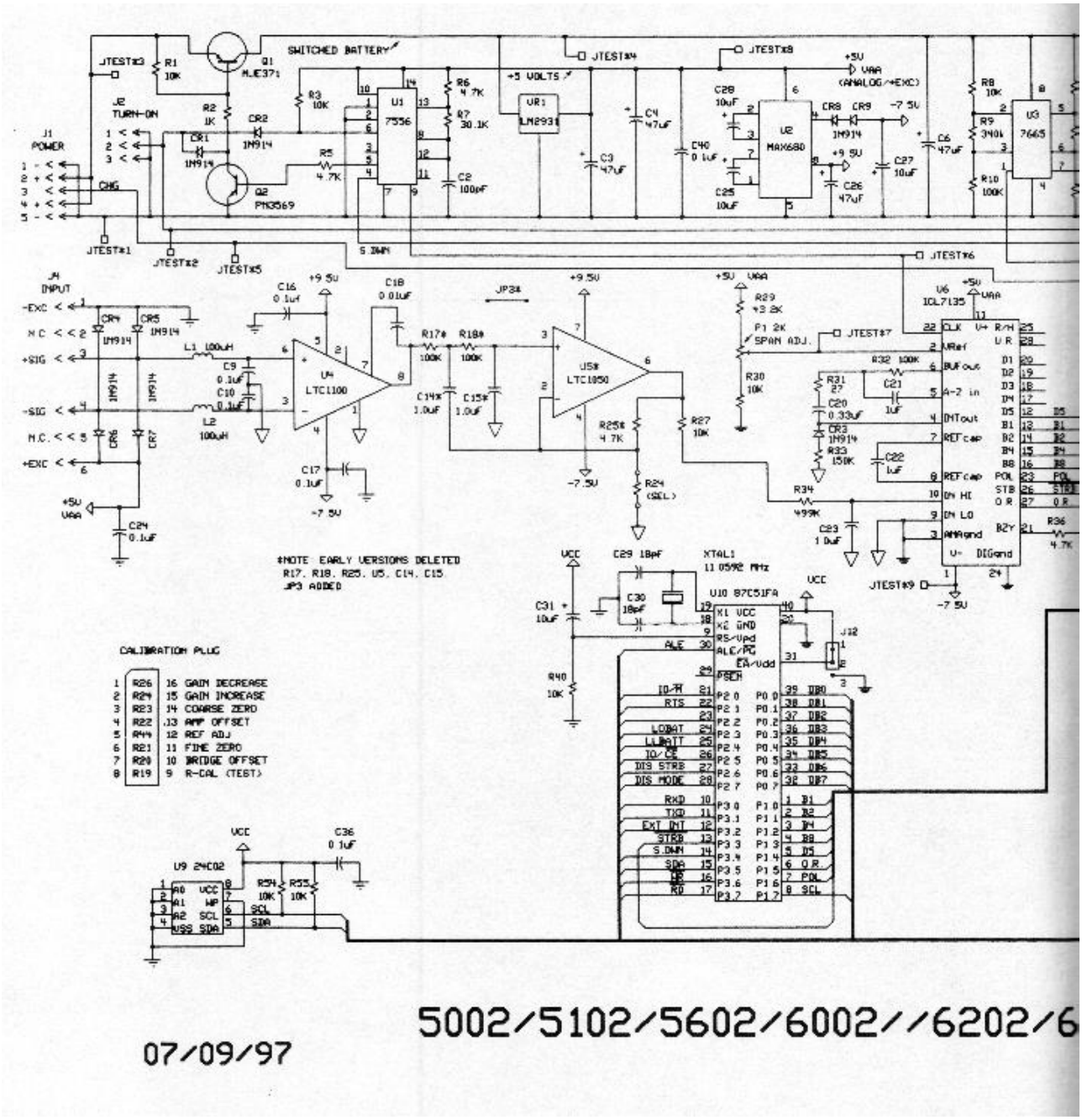
MAST Components for 5002, 5702, 6002, 6702

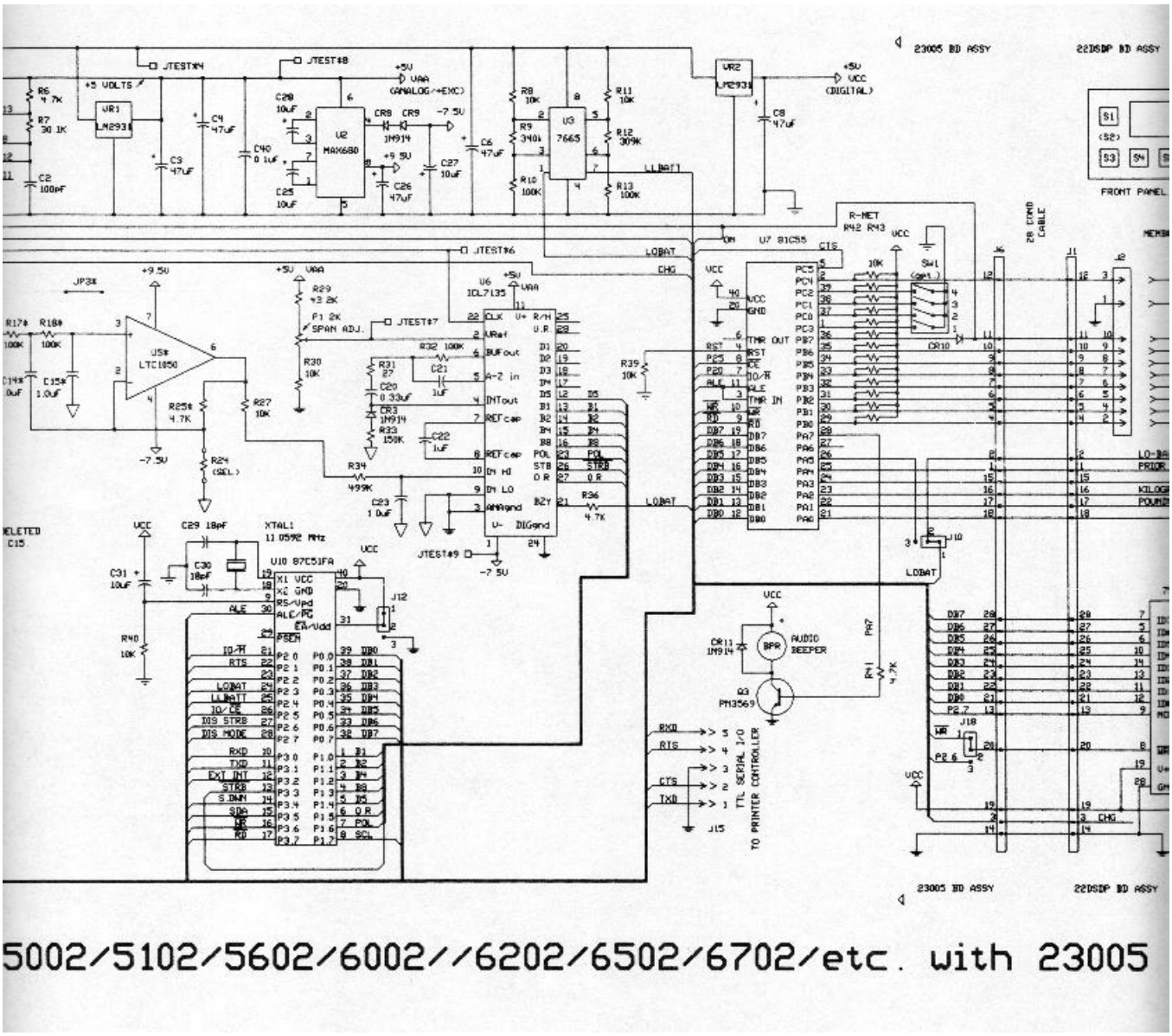
25066	BOLT. 1/4-20 X 1" HEX HEAD, SS
30374	WASHER, 0.318" ID X 0.738" OD X 0.062 TK
40517	CORD POWER
139043	KNOB, LIBERTY P59139C-SN-C
255006	CALIBRATION PLUG 5002 6002
255008	CALIBRATION PLUG 6702/6702SP/6702W
341003	POWER SUPPLY EXTERNAL 12VDC
411693	PRINTER TEAR DOOR ASSEMBLY
450006-KIT	FIRMWARE 5002 V2.13.5
450007-KIT	FIRMWAREV2.08.6 6702/6702SP/6702W
620024	DOOR FS EXT PWR w/RS232 MASTED SCALE
630158	PRINTER SUB ASSEMBLY
630170	BATTERY HOLDER AND BRACKET
630175	PRINTER HOLDER PLATE ASSY
630227	ASSY, EXTERNAL AC PWR SUPPLY HARNESS
630229	MAST BATTERY COVER W/ KNOB
700076	D CELL BATTERY
720024	SWITCH ASSY LB/KG W/RS232
720025	SWITCH ASSY KG ONLY W/RS232
750002	CABLE, INTERIOR MAST GRAY SCAL
750068	CABLE, 4" RIBBON 2 X 14
039301W	HANDLE MAST GRAY
039302W	PIN ALIGNER MAST HANDLE
039317W	DOOR GRAY FRONT MAST PRINTER
620000	PANEL BATTERY/ACCESS GRAY
700027W	PCB DISPLAY ASSEMBLY
700051W	PCB MAIN INSTRUMENT (No Cal Plug and No Firmware Chip)
710036W	HARNESS DATA PCB TO PRINTER
710037W	HARNESS POWER PCB TO PRINTER
620004	PANEL. RS-232
710031W	HARNESS, RS-232 DATA
620000	PANEL BATTERY/ACCESS GRAY
23709	Thermal Printer Paper (Box 15 rolls)
23707	SPINDLE PAPER FOR PRINTER
41013	CONNECTOR, 5 PIN CE100F24-5-CB
750053	CABLE, GROUND
710078W	Harness, 12V Ext Power Supply
412310	ASSY 700051 MAIN PCBA, 5002, STD
412311	ASSY 700051 MAIN PCBA, 5002, KG
412312	ASSY 700051 MAIN PCBA, 5002, STD, PRT
412313	ASSY 700051 MAIN PCBA, 5002, KG, PRT
412316	ASSY 700051 MAIN PCBA, 5702, STD
412325	ASSY 700051 MAIN PCBA, 5702, KG
412326	ASSY 700051 MAIN PCBA, 5702, STD, PRT
412327	ASSY 700051 MAIN PCBA, 5702, KG, PRT
412317	ASSY 700051 MAIN PCBA, 6002, STD
412321	ASSY 700051 MAIN PCBA, 6002, KG
412322	ASSY 700051 MAIN PCBA, 6002, STD, PRT
412323	ASSY 700051 MAIN PCBA, 6002, KG, PRT
412324	ASSY 700051 MAIN PCBA, 6702, STD

Options

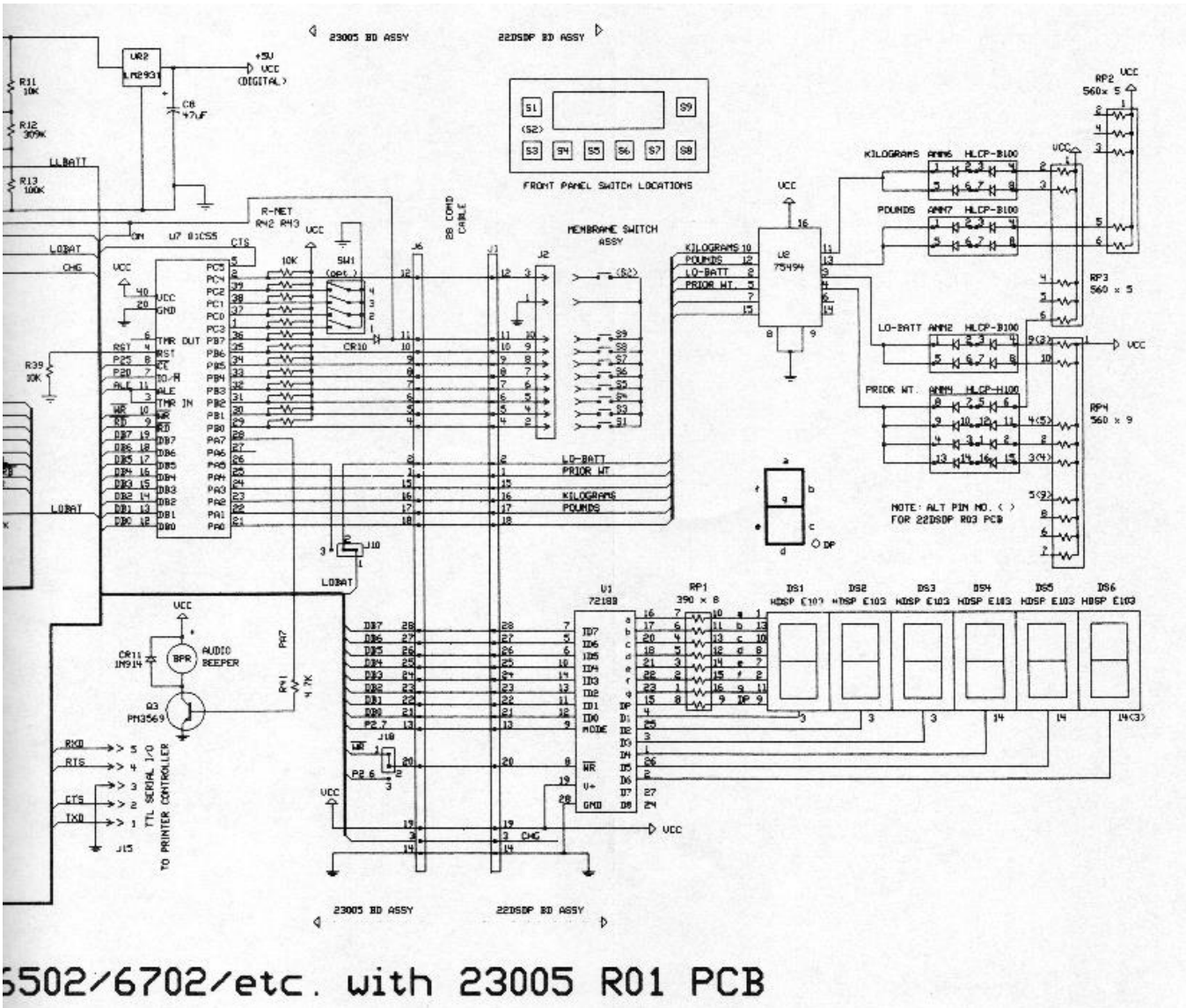
50224	Handrail for 5002
60224	Handrail for 6002 / 6702
030293W	Handrail for 5702
845010	Height gauge for 5002 / 6002 / 6702 gray
845010B	HEIGHT GAUGE FOR 5702
845010M	Height Gauge for 5002 (Metric only)
845010W	Height Gauge for Wall Mount

Schematics & Part Diagrams

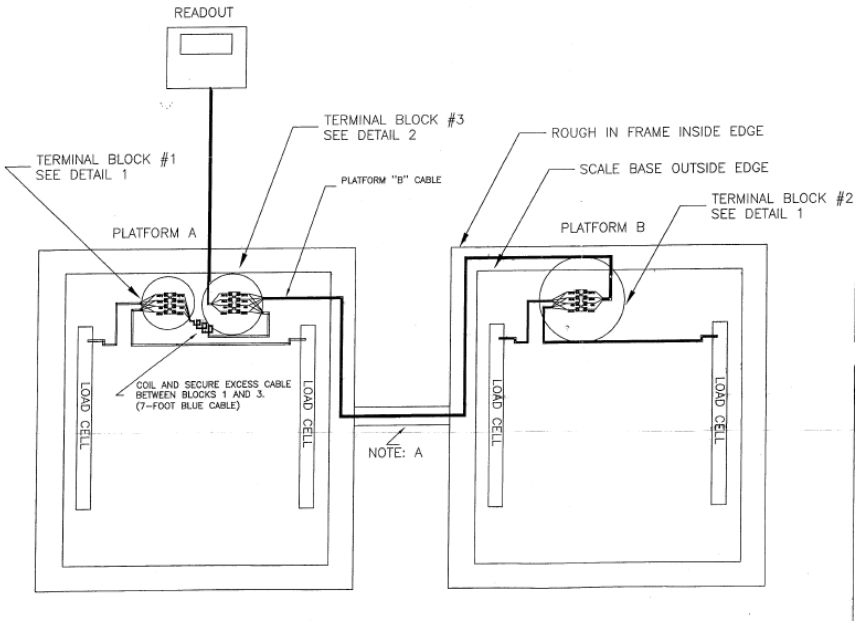


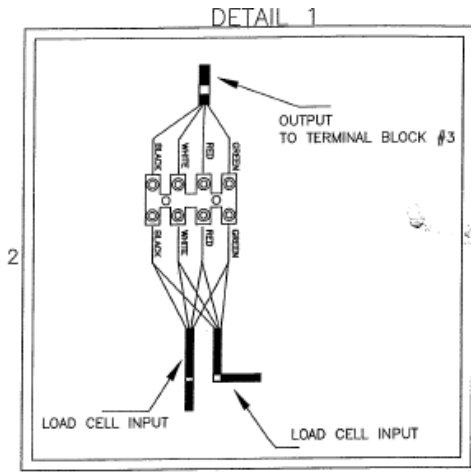


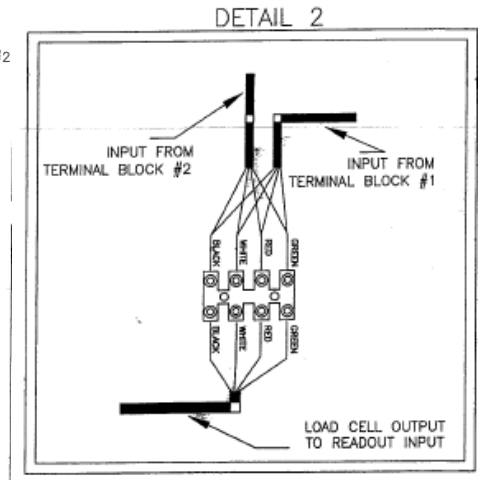
5002/5102/5602/6002//6202/6502/6702/etc. with 23005

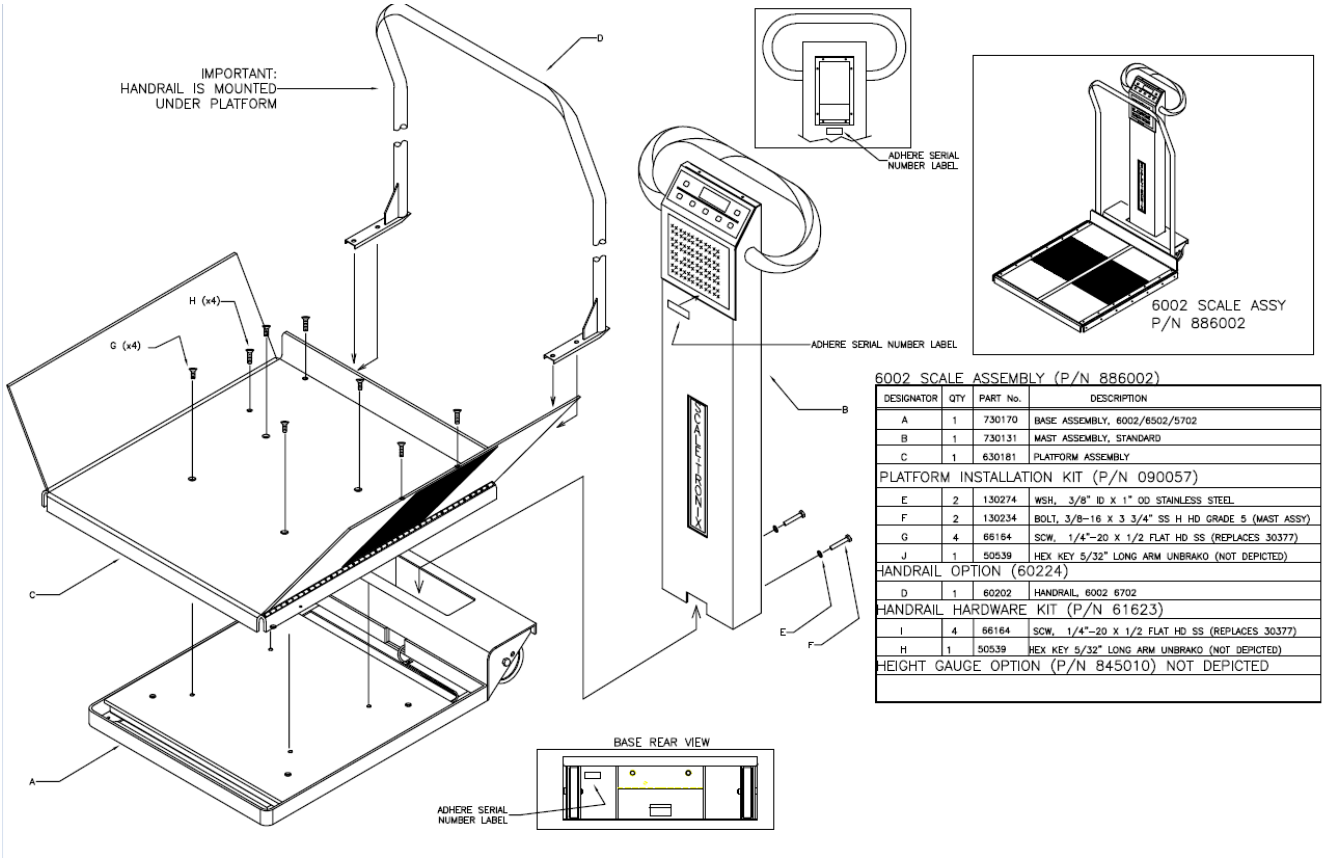


6502/6702/etc. with 23005 R01 PCB


READOUT
TERMINAL BLOCK #1
SEE DETAIL 1
TERMINAL BLOCK #3
SEE DETAIL 2
PLATFORM "B" CABLE
ROUGH IN FRAME INSIDE EDGE
SCALE BASE OUTSIDE EDGE
TERMINAL BLOCK #2
SEE DETAIL 1
PLATFORM A
PLATFORM B
LOAD CELL
LOAD CELL
LOAD CELL
LOAD CELL
COIL AND SECURE EXCESS CABLE
BETWEEN BLOCKS 1 AND 3.
(7-FOOT BLUE CABLE)
NOTE: A

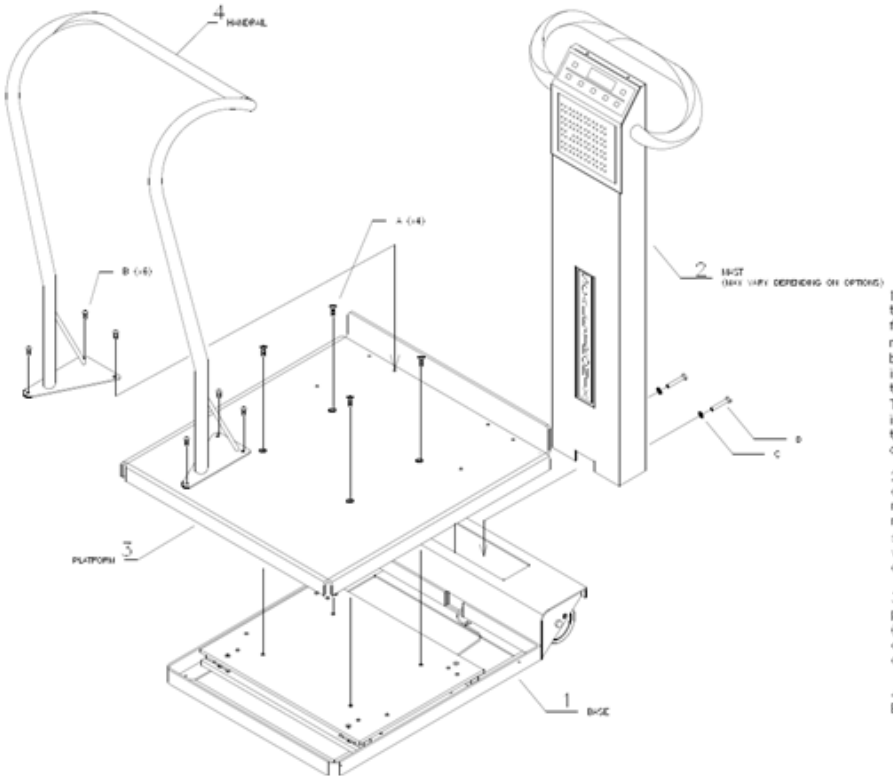

DETAIL 1
OUTPUT
TO TERMINAL BLOCK #3
BLACK
WHITE
RED
GREEN
LOAD CELL INPUT
LOAD CELL INPUT


DETAIL 2
INPUT FROM
TERMINAL BLOCK #2
INPUT FROM
TERMINAL BLOCK #1
LOAD CELL OUTPUT
TO READOUT INPUT



6002 SCALE ASSEMBLY (P/N 886002)

DESIGNATOR	QTY	PART No.	DESCRIPTION
A	1	730170	BASE ASSEMBLY, 6002/6502/5702
B	1	730131	MAST ASSEMBLY, STANDARD
C	1	630181	PLATFORM ASSEMBLY
PLATFORM INSTALLATION KIT (P/N 090057)			
E	2	130274	WSH, 3/8" ID X 1" OD STAINLESS STEEL
F	2	130234	BOLT, 3/8-16 X 3 3/4" SS H HD GRADE 5 (MAST ASSY)
G	4	66164	SCW, 1/4"-20 X 1/2 FLAT HD SS (REPLACES 30377)
J	1	50539	HEX KEY 5/32" LONG ARM UNBRAKO (NOT DEPICTED)
HANDRAIL OPTION (60224)			
D	1	60202	HANDRAIL, 6002 6702
HANDRAIL HARDWARE KIT (P/N 61623)			
I	4	66164	SCW, 1/4"-20 X 1/2 FLAT HD SS (REPLACES 30377)
H	1	50539	HEX KEY 5/32" LONG ARM UNBRAKO (NOT DEPICTED)
HEIGHT GAUGE OPTION (P/N 845010) NOT DEPICTED			



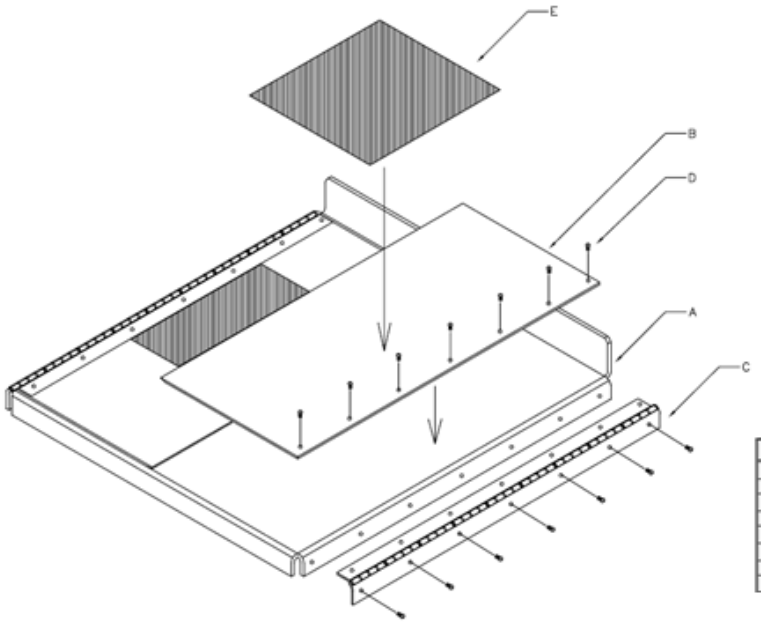
INSTRUCTIONS

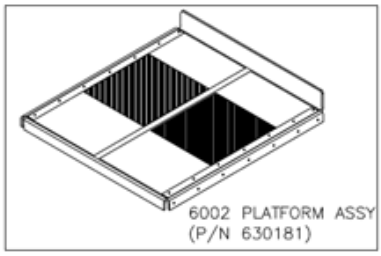
1. Insert the mast into the base opening, with the readout facing the scale platform. Simply insert fully into the opening, and install the two long mounting bolts and washers ("C" washers and "D" bolts on drawing). The electrical connection is made automatically when the mast is inserted to the base. It will only fit in the proper direction. Tighten firmly with a 9/16 inch wrench. It is imperative that both bolts be as tight as possible to prevent wobbling of the mast. Tighten the bolts, and then tighten some more!

2. Place the weighing platform in position on top of the scale, with the folded up side close to the mast. Align the platform to line up with the four mounting holes, and install using the 4 flat head screws ("A" screws on drawing). Tighten securely with the allen wrench supplied. Be sure the heads are flush and tight.

3. Install the stainless steel handrail on the platform and mount with the 6 button head screws ("B" screws on drawing). Tighten securely with the allen wrench supplied. Be certain these screws are very tight.

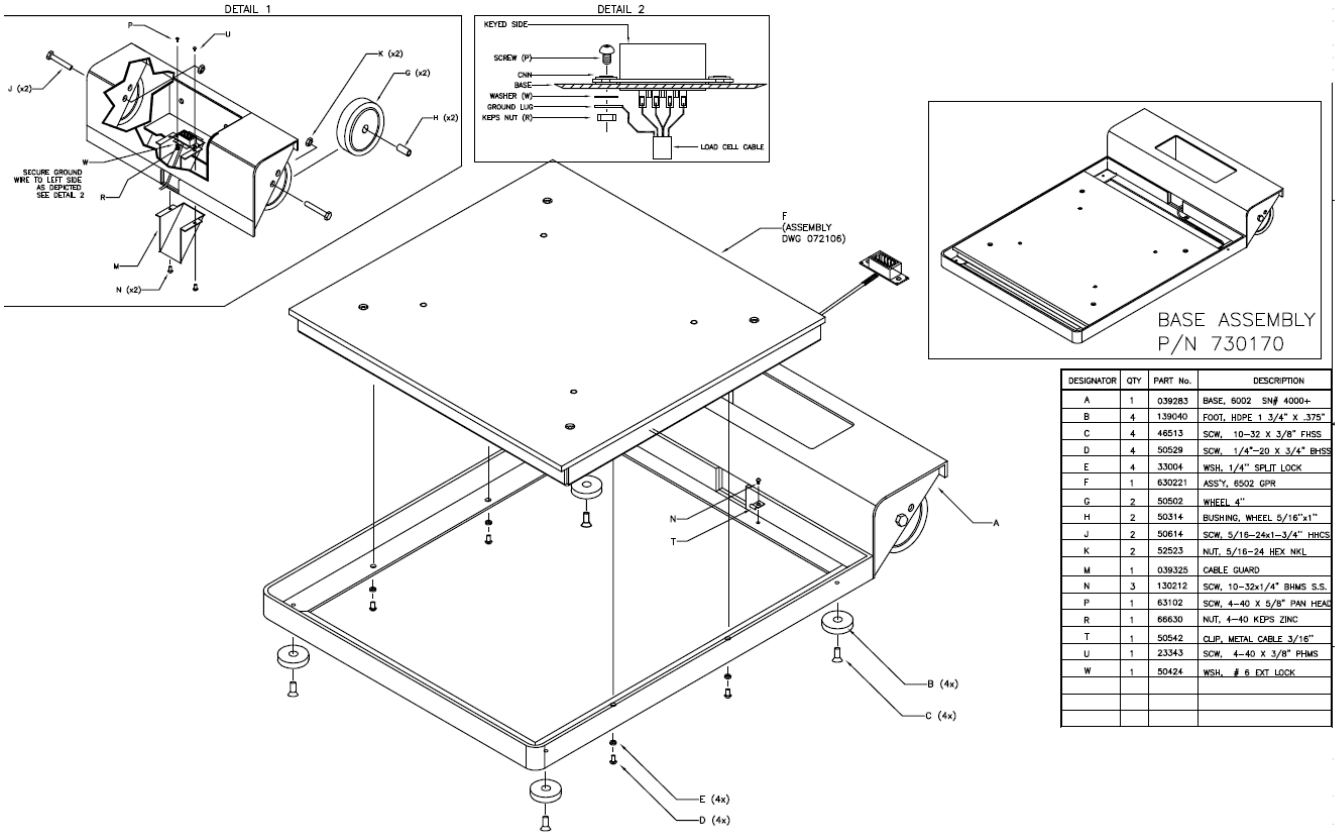
4. This completes the assembly of your 5702 Bari-Scale. The scale is ready for use.



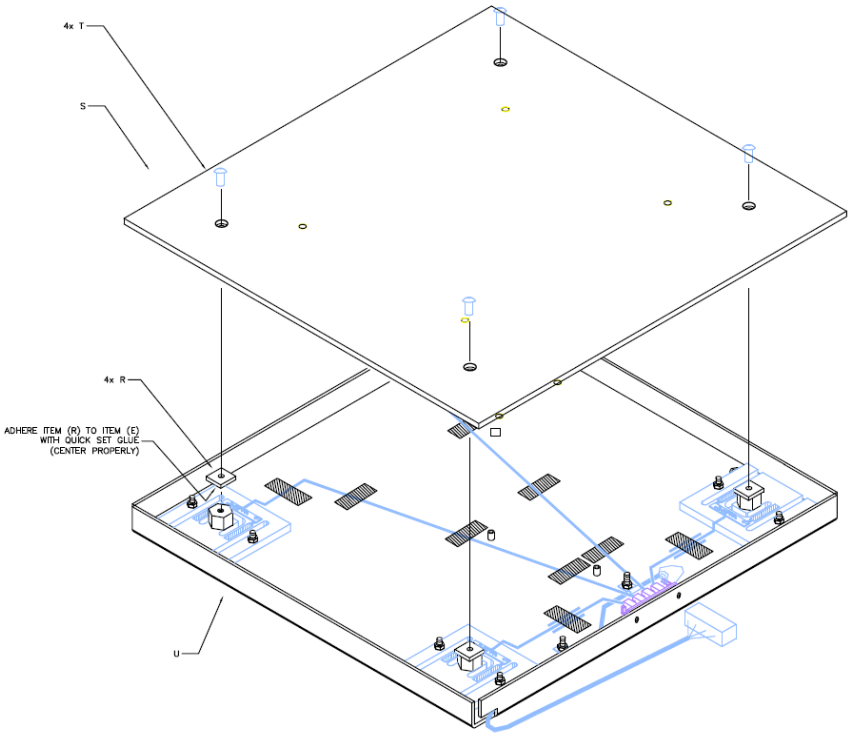


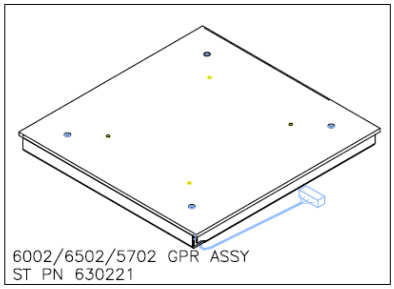
6002 PLATFORM ASSY
(P/N 630181)

DESIGNATOR	QTY	PART No.	DESCRIPTION
A	1	039300	PLATFORM, 6002 SN>4000
B	2	030019	RAMP, 6002
C	2	020003	HINGE, PIANO 26"-6002
D	28	130212	SCW, 10-32 X 1/4" BHWS SOC S.S.
E	2	531011	SHUR STEP, GRAY 6002 12" X 9 3/4"



DESIGNATOR	QTY	PART No.	DESCRIPTION
A	1	039283	BASE, 6002 SN# 4000+
B	4	139040	FOOT, HDPE 1 3/4" X .375"
C	4	46513	SCW, 10-32 X 3/8" FHSS
D	4	50529	SCW, 1/4"-20 X 3/4" BHSS
E	4	33004	WSH, 1/4" SPLIT LOCK
F	1	630221	ASS'Y, 6502 GPR
G	2	50502	WHEEL 4"
H	2	50314	BUSHING, WHEEL 5/16"x1"
J	2	50614	SCW, 5/16-24x1-3/4" HHCS
K	2	52523	NUT, 5/16-24 HEX NKL
M	1	039325	CABLE GUARD
N	3	130212	SCW, 10-32x1/4" BHMS S.S.
P	1	63102	SCW, 4-40 X 5/8" PAN HEAD
R	1	66630	NUT, 4-40 KEPS ZINC
T	1	50542	CLIP, METAL CABLE 3/16"
U	1	23343	SCW, 4-40 X 3/8" PHMS
W	1	50424	WSH, # 6 EXT LOCK





6002/6502/5702 GPR ASSY
ST PN 630221

TOP PLATE MOUNTING PROCEDURE

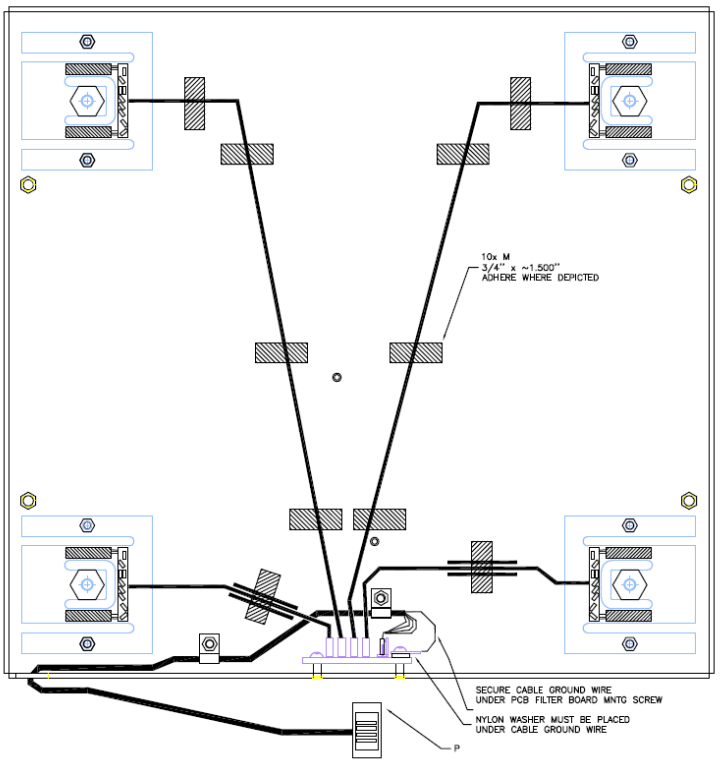
1.– PLACE TOP PLATE (REFERENCE DESIGNATOR (S)) OVER LOAD CELLS

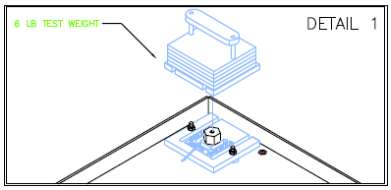
2.– IMPORTANT A DAB OF BLUE LOCTITE 242 ON MOUNTING SCREW THREADS (DESIGNATOR T) IS REQUIRED BEFORE FASTENING..

3.– FASTEN TOP PLATE TO LOAD CELLS WITH SCREWS FROM ITEM 2 ABOVE. SNUG SCREW, BUT DO NOT OVER TORQUE

DESIGNATOR	QTY	PART No.	DESCRIPTION
R	4	50509	EAR MATERIAL
S	1	030352	PLATE, 6002 GPR TOP
T	4	40408	SCW, 10-32 X 3/8" BUTTON HD SOCK
U	1	630209	ASS'Y, GPR BOTTOM PAN

ST PN 630209 (GPR BOTTOM PAN ASSEMBLY)





LOAD CELL TEST PROCEDURE

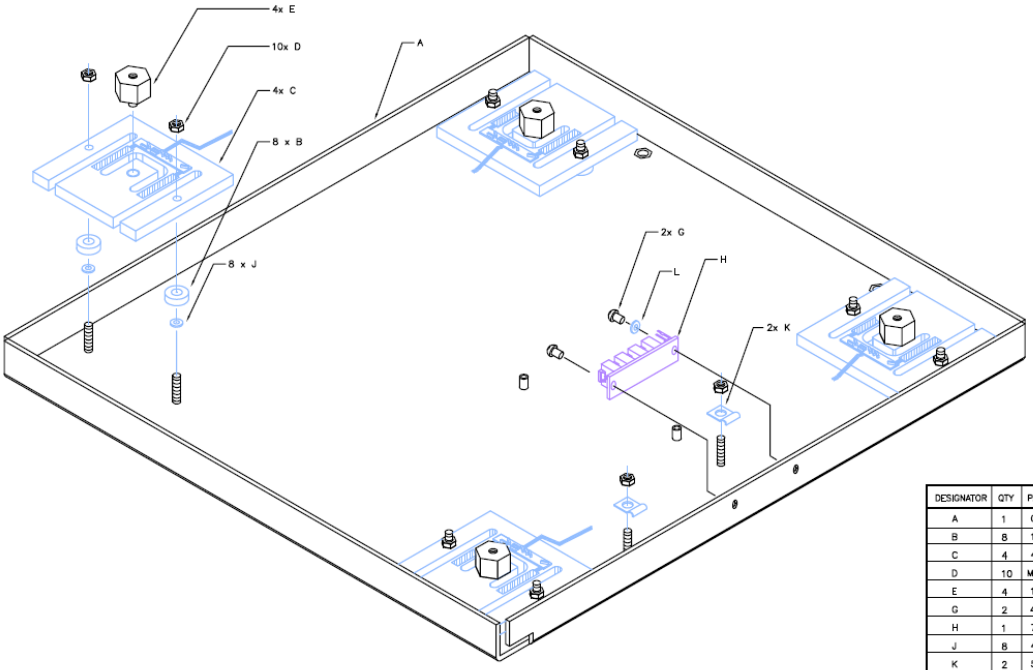
1.– CONNECT ALL FOUR (4) LOAD CELLS AS DEPICTED IN DRAWING

2.– CONNECT TRANSCELL TESTER (TI–500E) TO GPR OUTPUT CABLE (REFERENCE DESIGNATOR (P))

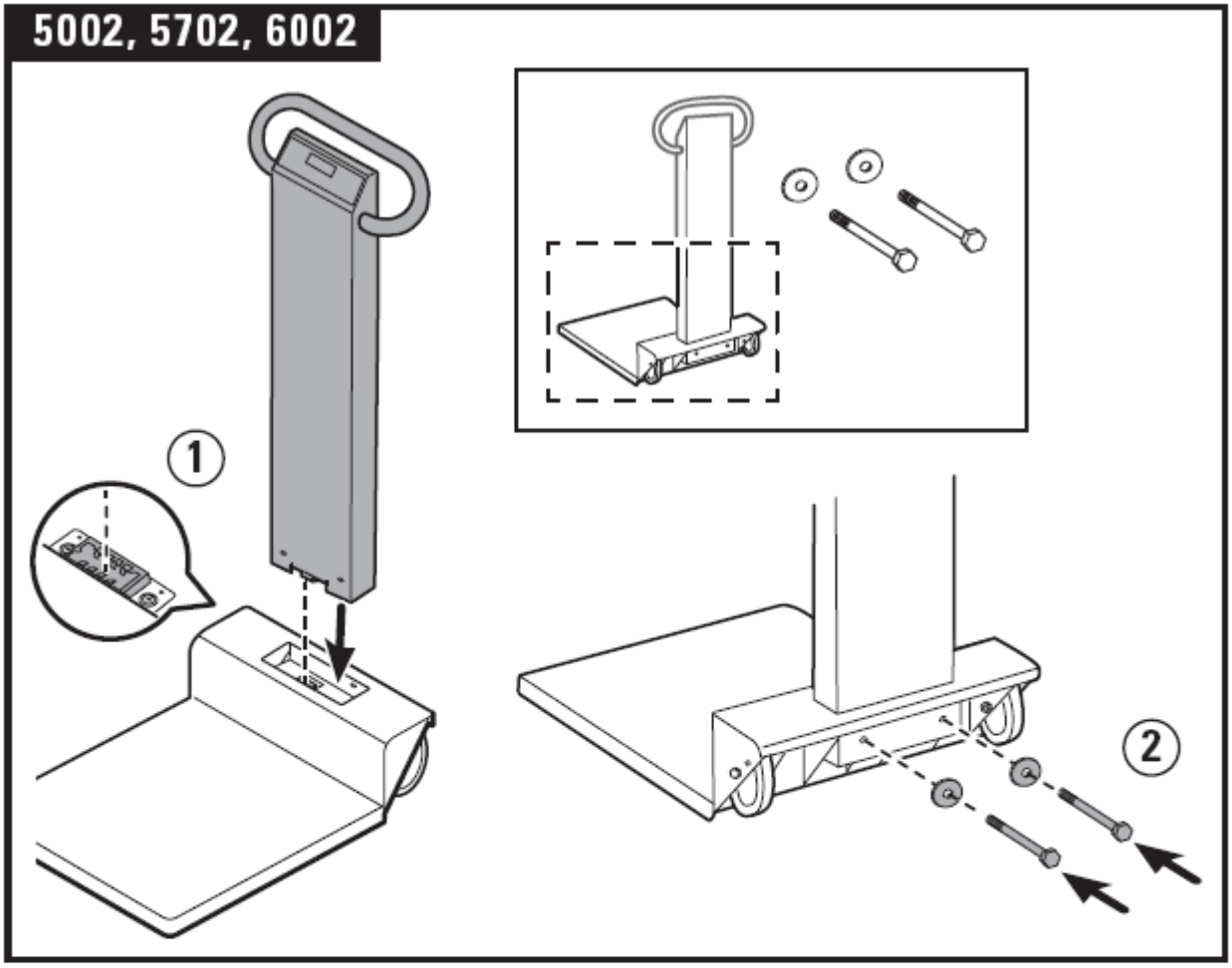
3.– PLACE THE 6–LB TEST WEIGHT, SEE DETAIL 1, OVER EACH LOAD CELL AND ASSURE THE TRANSCELL TESTER READS 6–LBS. REPEAT FOR EACH OF THE FOUR (4) LOAD CELLS.

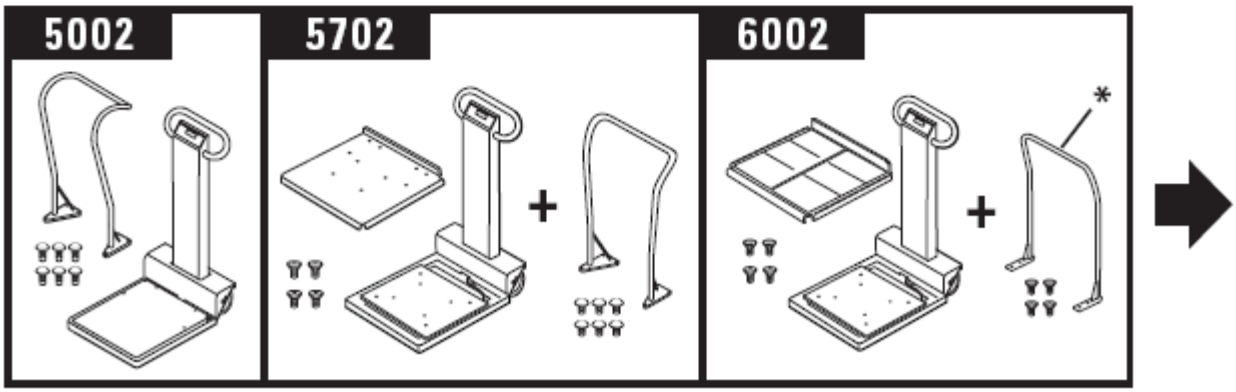
4.– IMPORTANT IF ANY OF THE LOAD CELLS READ:
- A) LESS THAN 6–LBS, CHECK WIRING. IF THERE ARE NO LOOSE WIRES, REPLACE LOAD CELL
- B) MORE THAN 6–LBS, CHECK WIRING. IF THERE ARE NO LOOSE WIRES, REPLACE LOAD CELL
- C) NEGATIVE 6–LBS, CHECK WIRING COLOR CODE SEQUENCE AND ASSURE ALL CONNECTIONS ARE CORRECT.

DESIGNATOR	QTY	PART No.	DESCRIPTION
M	10	138024	TAPE, FOIL 3/4" X 60 YDS 3M #425
P	1	750092	CABLE, GPR OUTPUT

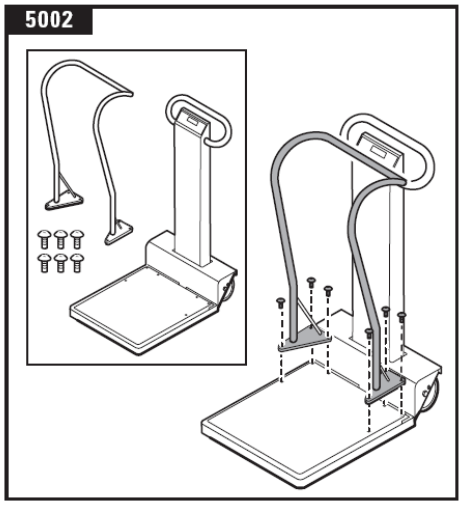


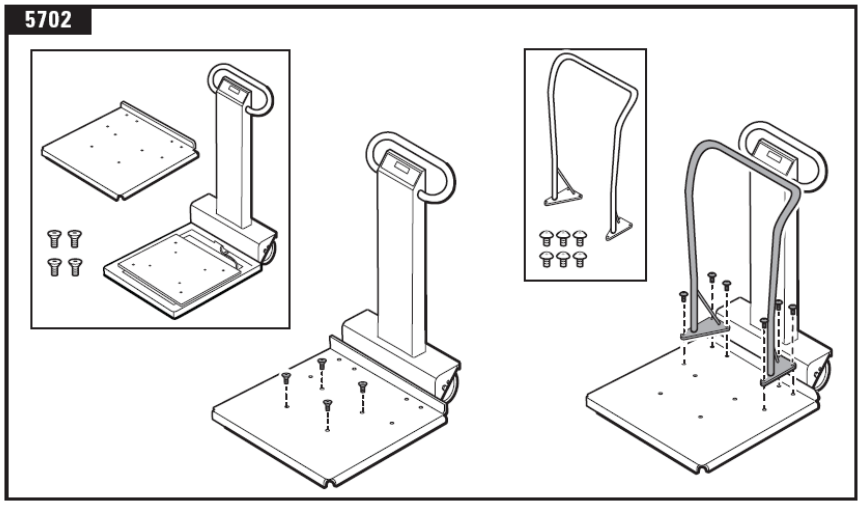
DESIGNATOR	QTY	PART No.	DESCRIPTION
A	1	030298	BOTTOM PAN, 5002 GPR
B	8	132069	WSH, 1/4" ID 5/8" OD X 1/8" THICK
C	4	400039	LOAD CELL, WINGBACK ADULT
D	10	MLA–1030	NUT, 10–32 HEX
E	4	133110	LOAD MOUNT, METAL 3/4" HEX GPR
G	2	48611	SCW, 6–32 X 1/4" PHIL PAN HD EXT SEMS
H	1	700125	PCB ASSY, TERMINAL JUNCTION WITH RFI FILTER
J	8	40409	WSH, #10 FLAT NKL
K	2	50542	3/16" METAL CABLE RESTRAIN CLAMP
L	1	48143	WSH, NYLON FLAT #6 X 0.315 X 0.062"

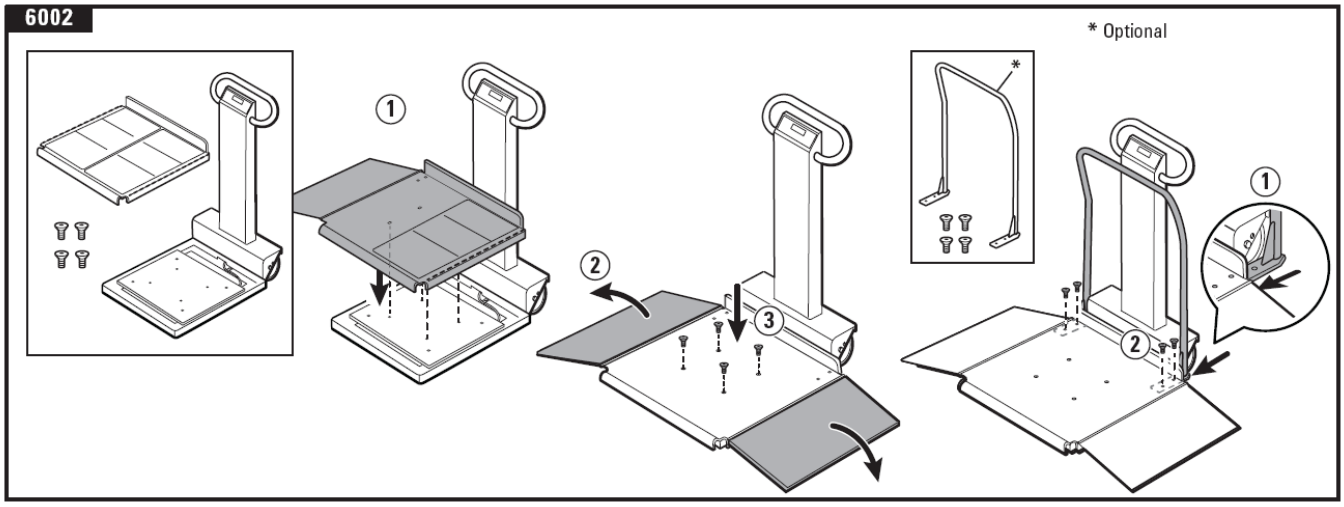




* Optional


5002


5702


6002
* Optional
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